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A simultaneous investigation of biological and family factors in schizophrenia.

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A SIMULTANEOUS INVESTIGATION

OF

BIOLOGICAL AND FAMILY FACTORS IN SCHIZOPHRENIA

A Dissertation Presented

By

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Submitted to the Graduate School of the
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Dedicated to

Murray Alpert

Florence Halpern

Walter Kass

with respect, gratitude and affection

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ABSTRACT

A Simultaneous Investigation
of
Biological and Family Factors in Schizophrenia

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This investigation is organized into three experiments corresponding to the three-fold aim of the study. Experiment I sought to replicate and extend past findings on interaction patterns of intact families of male schizophrenics, and to explore some methodological issues that have emerged in the literature. Psychiatric patients and their parents, equivalent in status on a number of variables, constituted control groups. The subject pool was extended to include families of female patients and single-parent families in a 2 (diagnosis) x 2 (sex of patient) x 2 (number of parents) design. 46 dyads and triads of patient and parents were studied using several different methods: the 20 Questions Task, the Family Group Rorschach and the Ferreira-Winter Questionnaire. Past findings indicating that families of

schizophrenics are as efficient in group problem solving tasks, that schizophrenic patients are less dominant in their families, and that parents of schizophrenics show more communication deviance were replicated for all schizophrenic groups in comparison to psychiatric controls. In addition it was found that across groups, schizophrenic patients are less efficient in the individual context than psychiatric controls, and the family of the schizophrenic maintains effective functioning because of the contributions of the parents. There was no major main effect of sex in the study. It was found that single-parent families show more difficulty in group functioning and more communication deviance, when compared to two-parent families. This pattern suggest hierarchical disturbances in single-parent families. The constellation that showed the most deviance was the single-parent family of the schizophrenic male, where interaction resembles a disengaged pattern. In the female counterpart to this family, the pattern is one of enmeshment. The simultaneous use of several methods made it possible to consider relationships between different measures presumed to relate to the same underlying construct. It was found, particularly in the case of dominance, that measures do not correlate highly. However this may have to do with the multivariate nature of the construct rather

than a lack of reliability.

Experiment II compared platelet MAO levels in parents of schizophrenics and psychiatric controls. While the former group did not have the predicted lower activity, the trend was in this direction.

Experiment III was a simultaneous consideration of the family interaction measures of Experiment I and MAO activity measures of Experiement II. It was found that low MAO correlated with improvement in the family situation for parents of schizophrenics but not for parents of controls. Parents of controls benefited from high MAO activity unlike parents of schizophrenics. The data suggested several possible models including a model of interaction between the biological substrates for schizophrenia, or the stylistic predisposers, and family interaction patterns, or the conditioning and modulating factors. This model was presented as a heuristic for further research.

The clinical implications of the data, and research directions suggested from this study were explored.

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CHAPTER I

INTRODUCTION

The Case for the Simultaneous Study of Family and Biological Variables

There is a recent trend away from conceptualizing schizophrenia as determined exclusively by genetic or enviromental factors (Reiss and Wyatt, 1975; Zubin and Spring, 1977). However this development is primarily on the level of theory. In practice, the different schools have taken an "either-or" approach: either the environment and family interaction factors are responsible for the schizophrenic disorder, or genetic factors and enzyme deviations are the etiological factors of importance. Researchers have generally attempted to prove the effect of their variable to the exclusion of the others. Lidz (1976) and Rosenthal, Wender, Kety, Schulsinger, Welner and Rieder (1975) have recently represented this attitude among family researchers and genetic researchers respectively. Lidz rejects the genetic data, claiming that schizophrenia is not a disease, but a developmental disorder. Rosenthal, et al., suggest that adoption studies support the idea that genetic factors are prepotent; and they argue that studies of parent-child interaction do not yield any data that contradict the idea that it is genetic factors that are crucial. They conclude their examination of some studies of parent-child relationships

with the statement ". . . even with the best of circumstances, investigators will still not be able to determine . . . how much of the behaviors noted stemmed from familial genes or from mutual influence of parents and children," (p. 476).

As the medical sciences become more sophisticated, there is greater acknowledgement of the role of both biology and environment in the production of many disorders (Weiner, 1977). Although both biological and family researchers have made important contributions to understanding the etiology of schizophrenia, further progress in the field is likely to depend on efforts at integrating these two perspectives. The remainder of this chatper attempts to lay the ground work for such integrative effort.

First, let us consider the objections from the biologists regarding the study of environmental factors in general, and family studies in particular. The strongest level of criticism comes from those biologically oriented investigators who believe that schizophrenia is purely a genetically transmitted disorder, and that the study of environmental factors can contribute nothing to the understanding of its etiology and course. This is an extreme statement of the position, as even the strongest genetic data show a heritability of less than 100% (Stewart, 1980). There have been reports of monozygotic twins discordant for schizophrenia (Pollin and Stabenau, 1968), and since such twins have

identical genetic makeup, it would be difficult to explain this occurrence on the basis of chromosomal attributes alone.

Criticisms from the more empirically oriented researchers regarding the lack of methodological rigor typical of family research provides a more difficult problem for attempts at integration. This criticism has been made not only by bio-psychologists, but also from researchers within the field (Jacob, 1975). A major difficulty in family research seems to be a necessary leap from observations in the laboratory to conceptual constructs, with much room for interpretation in between. For example, are we getting a measure of family conflict if we count the number of disagreements between members during the limited time that the family is observed in the artificial experimental setting? Or does disagreement indicate instead a flexible family which allows members to challenge each other? Or is it both? How do we quantify these separately? (Reiss and Wyatt, 1975).

Related to the necessity for the leap is the fact that in a rich, complex, multi-dimensional process like family interaction, only the most simplistic aspects can be observed, quantified and measured directly. There is always the danger that the data involve either the rigorous observation of the trivial, or highly inferential suggestions of the complex.

Family researchers have fallen short of the rigor that

other experimental psychologists have been able to impose on their subject matter. Is it possible to be more rigorous and still do justice to the complexities of the issues involved? It seems that in some ways at least, this is possible. The field is open and ripe for research. Past shortcomings can be learned from. Following are some guidelines that would improve the quality of future research:

a) Adequate control groups have not always been used in family studies. Indeed occasionally, control groups have been left completely out of the design. Jacob (1975) identifies previous shortcomings of direct observation studies of family interaction, providing the following guidelines for proper control: (i) Experimental and control families should be comparable in as many of the following demographic variables as possible: age, sex, birth order of child, socioeconomic status, religion and ethnicity: (ii) ratings must be done blind; (iii) reasonable agreement between independent raters must be obtained; (iv) data obtained from families with male and female identified patients should be analyzed separately, as there is evidence that major differences exist in family response to male and female offspring; (v) experimental and control groups should be run in the same setting to avoid confounding due to the effect of the surroundings: (vi) experimental and control groups should be equivalent in secondary status such as hospitalization as

this influences family response and interaction.

b) Related to the aspect of control is the need to carefully describe the individuals involved in the study to allow data from different experiments to be comparable. Many previous investigators simply divide into "normal" and "abnormal" groups. Certainly narrower criteria than abnormality should be used for selection into the experimental group, particularly as some of the research reviewed (Wild, Shapiro and Goldenberg, 1975) suggests that families of schizophrenics differ qualitatively from families of children with neurotic disorders.

c) Intuitive concepts must be operationalized so that a data base for their incorporation or refutation can be gathered. Concepts like "fragmentation" or "amorphousness" (Singer and Wynne, 1963, 1965) must be translated into a language of observation and measurement, and must be independent of the intuitive and clinical skills of the observer. Related to this is Jacob's (1975) guideline for achieving inter-rater reliability. A fully operationalized concept can be understood and used similarly across experimenters. Unquantifiable process measures must be reduced as far as possible, as their measurement depends heavily on skills which vary across experimenters. Where unquantifiable process measures cannot be operationalized, great emphasis must be placed on the collection of data with full report

of reliability and careful double blind controls.

d) In order to obtain construct validity, reliance on single measures will have to be reduced. A construct such as "dominance" in the family has been variously measured by a number of different kinds of observations by different experimenters, such as who talks most (Farina and Holzberg, 1968), who has talk directed to him or her the most (Murrell and Stachiowak, 1967), who interrupts most (Lennard, Beaulieu and Embry, 1965), who wins most in a game involving some cooperation between competitors (Becker and Iwakami, 1969), and whose opinion is most likely to emerge as group opinion on a variety of tasks (Ferreira and Winter, 1968). Are these all measuring the same thing? The use of a variety of different measures and construct validity testing, will be a necessary development in the field of family literature, tightening the relationship between constructs and data.

Thus the major impediment to consideration of family research on the part of biologically oriented investigators is the methodological shortcomings of the family research. What are the family researchers' hesitations against consideration of biological variables in the larger picture of schizophrenia?

The primary cause for the rejection of the importance of biological variables seems to come from the belief on the part of many family theorists that the system must remain

the unit of investigation, while biological researchers of course, study individual variables such as biochemical measures. First, the question of whether the system and the individual can be simultaneously valid points of study will be considered.

Reiss and Wyatt (1975), urging the simultaneous study of the individual and the system, provide a model that gives importance to both. They argue that it is necessary to take account of variables that influence individual development, and also those that maintain family interaction patterns. Thus, the concept of vulnerability of the individual does not deny the importance of the role of the family in the production and maintenance of the symptomatology of one of its members.

For example, deviant behavior in offspring is seen by family therapists (see e.g. Waxler, 1975) as serving a function for the entire family. The family covertly encourages a member's deviant behavior, as it provides an opportunity for the family to clarify its norms and stengthen its sense of identity. Reiss and Wyatt (1975) suggest that this interaction can be seen as not only having a short-term effect on family identity development, it can also have a long-term stable impact on the "deviant" family member. Figure 1 illustrates this concept.

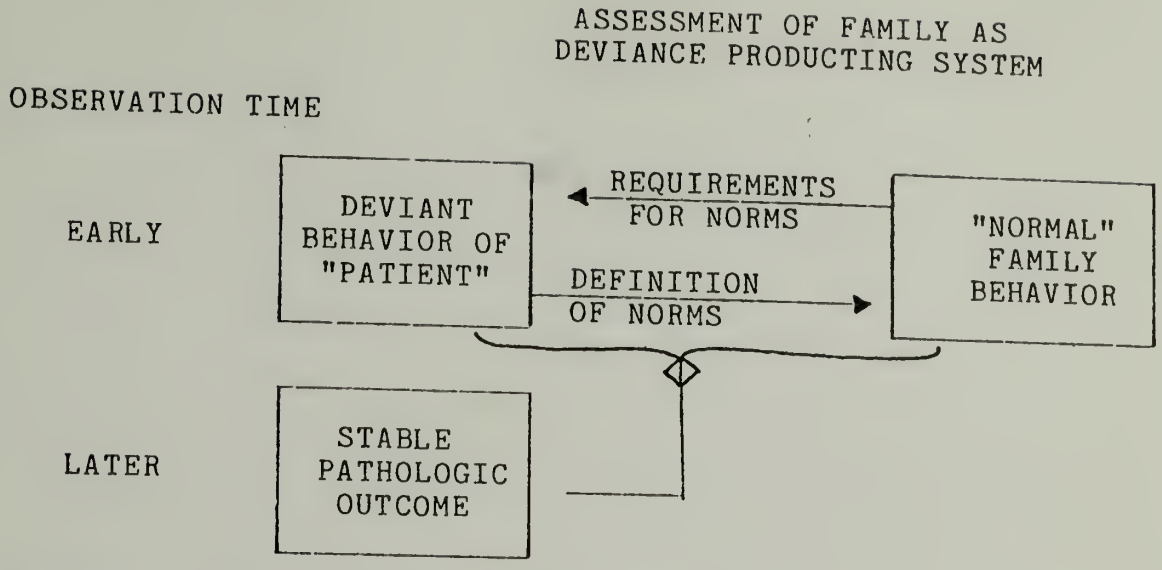

Figure 1. The family as a deviance producing system and the effect on the deviant member. (from Reiss and Wyatt, 1975 p. 76)

Reiss and Wyatt further give importance to interaction and individual history by illustration of a homeostatic mechanism parallel to the family.

> ". . . consider a family system made up of a thermostat, a furnace, and a room whose temperature is registered by the thermostat. If we want to know the variables that maintain room temperature, we will study the feedback control functions of the three-member system. We may also wish to study the variables that influence the developmental history of the furnace, considered individually. A helpful approach is consideration of the mean ambient temperature of the room as an index of the level at which the feedback system operates and assessment of its impact on the furnace. A feedback system set at a high level will lead to impaired development of the furnace: either an acute breakdown or a chronic, progressive withdrawal from service." (p. 75-76)

Thus in a family (a room consisting of furnace and thermostat) where one individual is showing schizophrenic

symptomatology (an aberrant temperature is being maintained), both the individual's unique history (information about characteristics of the furnace), and relationships within the family (relationship between the thermostat and the furnace, and characteristics of the room) would be important in understanding the individual's behavior.

Now that a conceptual model to allow the valid and simultaneous study of the individual and the family has been proposed, the question of whether the study of the individual is necessary at all will be considered. Are there long-term effects of family patterns on individuals? While clearly pathological systems can and do exist, their existence would have less tragic implications if the individuals that composed them did not carry their impact on a long-term basis. Even if the family is considered the etiological mechanism, and the symptoms may have been maintained within the family because of their service of family needs, adult schizophrenics maintain their symptomatology with and without families.

Another observation lends support to the study of the individual. While the family system may be pathological, it is not usual that all offspring in the family become schizophrenic (Slater and Lowie, 1971). Certainly different offspring have different significance for other family members, and there may be conscious or subconscious factors

involved in the choice of one as a scapegoat. However, all scapegoats do not become schizophrenic (Napier and Whitaker, [1978] for example, analyze neurotic symptoms using the scapegoat model), and the offspring that does, shows his or her particular vulnerability to the process by carrying such extremely deviant symptoms. If communcation patterns are seen as important family variables in the etiology of schizophrenia, as Singer and Wynne (1963) suggest, presumably all offspring are subject to these patterns. Why is is that usually only one carries the brunt of the effect?

Family systems theorists will have to ignore compelling data regarding genetic loading for schizophrenia if the symptoms are considered understandable exclusively as a manifestation of group function. Kety and his associates (Kety, Rosenthal, Wender and Schulsinger, 1968; 1976; Kety, Rosenthal, Wender, Schulsinger and Jacobsen, 1975) have performed a series of conceptually and methodologically sound studies which indicate that there is a definite genetic contribution to schizophrenia. A summary of these studies follows. The effect of the genetic constitution was separated from the effect of biological parents as adoptees were considered: where a biological parent shows schizophrenic symptomataology, the chances of the offspring doing the same even when he or she has been placed within a different family system is higher than that of a random adoptee;

when an adoptive parent is schizophrenic, the child will have no greater than random chance of also showing schizophrenic symptomatology. It would be difficult to explain these findings on a purely systems basis.

However, family theorists can certainly integrate the biological data into their models without destroying them. The "genetic loading" may predispose one family member to become the symptom bearer. It may also predispose towards certain kinds of symptoms (e.g. schizophrenic rather than manic) in a situation where a large number of possible deviations could well serve the same function for the family.

A quote from Spiegel and Bell (1959), pointing not only to the possibility of separately considering individual and family factors, but also to the necessity of eventually examining interrelationships of different levels of investigation, follows:

> "Essentially a field approach, the transactional point of view postulates that the events involving the sick individual with his family occur in a total system or interdependent subsystems, any one of which -- for example the individual, the family, the community, the value system -- may become temporarily the focus of observation. ...Within the field encompassing the interconnected systems, a component system, such as the individual, can be isolated and studied as an entity, but this is a heuristic device which always involves some distortion and sacrifice of precision or predictive ability.
>
> If this philosophical position is accepted, then the individual and the family are seen as subsystems which

are intimately and complexly interrelated. Neither has any greater "reality" than the other, and no characteristic of one or both has any necessary priority... Viewing one entity or process as causing another or as dependent on another is possible only if their interrelations can be isolated from total contexts. Putting variables within a total context shifts the question from "What in the family 'causes' pathology in the individual?" to "What processes occurring between the individual and the family are associated with the behaviors which are called 'pathology'?" (p. 156)

CHAPTER II

REVIEW OF THE LITERATURE

The parameters investigated in this dissertation are platelet monoamine oxidase (MAO) and family interaction patterns in families of schizophrenics and psychiatric controls. This chapter reviews the literature on the relationships between these parameters and schizophrenia. Lowered MAO activity in schizophrenia is a consequence consistent with the dopamine hypothesis of schizophrenia, which is currently one of the most viable biochemical models for the disorder (Snyder, Banerjee, Yamamura and Greenberg, 1974). Preceding the review of the MAO literature, the dopamine hypothesis of schizophrenia, and the relationship between MAO and dopamine will be outlined to provide the reader with a context for the MAO research.

Introduction to MAO Research

The dopamine hypothesis

The dopamine hypothesis implicates neurotransmitters in the etiology and symptomatology of schizophrenia. Pathological disturbance of neurotransmission are known to lead to somatic disorders such as myasthenia gravis and Parkinson's disease (Mountcastle, 1974). Neurotransmitters have also been studied in relation to psychological disorders. Of the neurotransmitters, two catecholamines, dopamine and norepinephrine have been most actively studied as possible substrates

for psychosis. They were considered deserving of extensive study as they seem to influence stress response and mood. Response to stress is considered an important factor in the etiology of schizophrenia. Stress studies have been conducted in man and other animals in a variety of situations, ranging from parachute jumping to change from salaried to piece-work conditions (Kety, 1967), shock avoidance (Iversen, 1977) and prolonged forced immobilization (Feldman, in press). The clear and consistent indication from these studies is that there is an increase in catecholamines under stressful conditions. Mood is known to be altered in psychotic states (Zubin and Freyhan, 1972). Many studies have examined the effects on metabolism in the animal brain of drugs known to alter mood in man. The suggestion from these studies is that a depressive mood may be related to a deficiency in catecholamines while euphoria and mania may be related to an excess of catecholamines (Schildkraut, 1972).

Catecholamines have also received considerable attention in the search for substrates of schizophrenia. The first of the newer antipsychotic drugs, reserpine, was discovered by accident. It had been used in India to treat a variety of ailments and as a sedative. It was effective as a tranquilizing agent, and acted without producing somnolence (Feldman, in press). This resulted in its experimental use as an antipsychotic, which continued until it was replaced

by the butyrophenones and phenothiazines. Reserpine is known to act via catecholamines (Feldman, in press). Other more effective antipsychotic agents, the butyrophenones and phenothiazines, are also know to act on catecholamine synapses (Snyder, et. al., 1974). Additionally, amphetamine, a drug that mimics schizophrenic symptoms in nonpsychotic individuals, also seems to act via the catecholamine synapses (Iversen and Iversen, 1975).

The dopamine hypothesis states that schizophrenic symptoms are the result of overactivity of dopaminergic neurons. Neurons can become overactive as a result of a number of different possible deviations in the organism. There may be an excess of transmitter substance produced: mechanisms for deactivating the transmitter, such as metabolizing enzymes may be deficient; the receptors on the postsynaptic cell may be hypersensitive, i.e., they may fire more often than normal cells in response to the same amount of transmitter; or there may be more receptors (Seeman, Lee, Chan-Wong and Wong, 1976).

What is the evidence for catecholaminergic overactivity in the schizophrenic? There has been an extensive search for direct evident of catecholaminergic overactivity: experimenters have measured postmortem catecholamine levels in the brains of schizophrenics (Barchas, Elliott and Berger, 1977), amine metabolite levels (Post, Fink, Carpenter and Goodwin, 1975), changes in the levels of enzymes neces-

sary for the breakdown of catecholamines (Murphy and Wyatt, 1972), changes in enzymes necessary for the synthesis of catecholamines (Wise and Stein, 1973), and levels of substances that are known to be altered by catecholamine levels in the brain (Meltzer and Stahl, 1974) (see Stewart, 1978, for a review of this literature). In general, the literature in this area is inconclusive, and at best. in some areas (such as in monoamine oxidase measures, which will be reviewed later) controversial. However the lack of direct physiological measures is not sufficient to discard the hypothesis. The lack of positive results may reflect the limitations of the tools and technology we have available to us. Our measures may be too gross to detect biologically significant differences. Additionally, excess levels of the transmitter may be present only in very specific areas of the brain, and at this point we do not know where schizophrenic symptoms are mediated.

The evidence for the dopamine hypothesis is stronger in the area of drug studies, and in the comparison of schizophrenia to amphetamine induced psychosis. The phenothiazines and butyrophenones are now widely used as antipsychotic treatment. They are highly effective, with specific action on schizophrenic symptoms (Snyder, et al., 1974). They seem to exercise their effect via catecholamines. The evidence for this comes from several different sources. They are structurally very similar to catecholamines (Horn

and Snyder, 1971). There is evidence to show that there is a correlation between particular catecholamine metabolic changes upon administration of the neuroleptic, and the degree of clinical efficacy of the drug (Carlsson and Lindquist, 1963). Additionally, the drug alpha-methyltyrosine which inhibits catecholamine snsthesis has the effect of reducing the amount of neuroleptic necessary to achieve antipsychotic effect (Carlsson, Persson, Roos and Walinder, 1972), suggesting that both alpha-methyltyrosine and antipsychotic drugs act on the same pathway. Thus, as developed in this paragraph, the dopamine hypothesis of schizophrenia is strengthened upon the suggestion that the antipsychotic action of neuroleptics is exercised via the catecholamine synapses.

A different line of evidence stems from the study of amphetamine induced psychosis. In certain dosages, amphetamine produces a psychosis which is very similar to paranoid schizophrenia (Snyder et al., 1974: Angrist, Sathananthan, Wilk and Gershon, 1974). The best relief for amphetamine psychosis can be obtained by the administration of phenothiazines and butyrophenones, the same drugs which are effective in relieving the symptoms of schizophrenia (Snyder et al., 1974). Amphetamines administered to schizophrenics serve to exacerbate their symptons (Janowsky, El-Yousef, Davis and Sckerke, 1973). Amphetamine is tied to schizophrenia

considered. Hollister (1962) found that individuals taking L.S.D. were easily distinguishable from schizophrenics in mental institutions. Additionally, schizophrenic patients administered L.S.D. reported that their experience on this drug was a completely new one, while amphetamines are known to selectively worsen schizophrenic symptoms.

Thus, the evidence for the dopamine hypothesis of schizophrenia does not come from direct measures of biological differences between schizophrenics and normals, but, from indirect measures, particularly the relationship between the neuroleptics and the catecholamines, and between schizophrenia and amphetamine induced psychosis which is catecholamine mediated. Another indirect line of evidence, providing not the conclusive missing links, but only the first clues to a larger picture, is provided by the data that have gathered around the role of monoamine oxidase (MAO) in schizophrenia.

The role of MAO in catecholamine metabolism

MAO and catechol-O-methyl-transferase (COMT) are responsible for the metabolic degradation of the catecholamines (Iversen and Iversen, 1977). Figure 2 presents the metabolic pathway for the catecholamines.

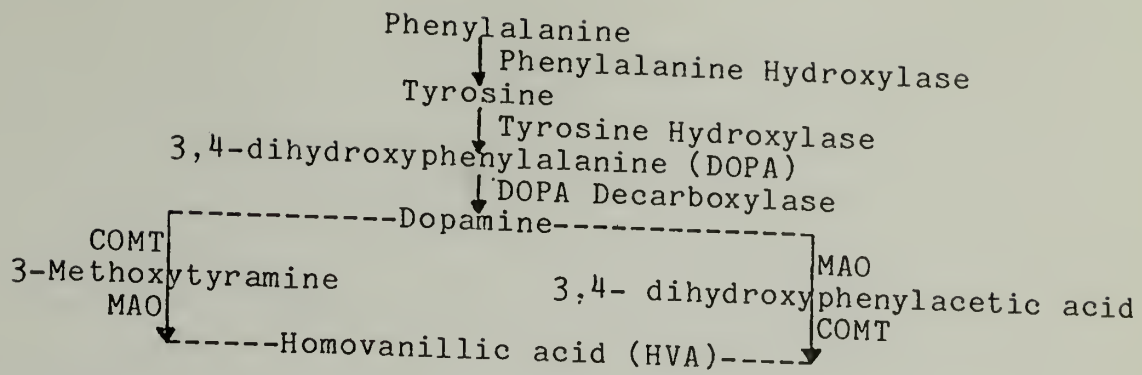

Figure 2: The pathways for synthesis and metabolism of dopamine.

MAO also appears to be important in cellular regulatory functions such as synthesis, accumulation and storage of the catecholamines. Induced lowering of MAO levels in animals have the effect of increasing the organisms' responsivity to environmental stimuli and result in biological changes involving decreases in blood pressure and increases in proportion of REM sleep (Murphy and Kalin, 1980).

Differences in MAO levels between individuals have implications relating to the dopamine hypothesis of schizophrenia. A decrease in MAO would result in an increase in dopamine availability at receptor sites, as the metabolic degradation of the catecholamines would decrease. For this reason, the early reports of a lowerered MAO activity in schizophrenic patients (Murphy and Wyatt, 1972), were received with much interest.

Review of the MAO Literature

The evidence relating MAO to schizophrenia.

The nature of the relationship between MAO and schizophrenia is somewhat obscure, and will most certainly prove to be complex. Murphy and Wyatt in 1972, reported lower platelet MAO activity in chronic schizophrenics compared to controls. In a follow-up study (Wyatt, Murphy, Belmaker and Cohen, 1973), these experimenters studied monozygotic twin pairs discordant for schizophrenia, and normal volunteers. It was found that in twin pairs, both the schizophrenic and the nonschizophrenic twin had significantly reduce MAO activity, and there was a high degree of correlation between measures for twins. As the twins were discordant for the disorder, the lowered activity would appear to be a genetic marker for vulnerability to schizophrenia, rather than a product of the full-blown illness. There was also a significant inverse correlation between the degree of the disorder in the schizophrenic twin and the extent of MAO activity. Since these early studies, a large number of reports of MAO activity have been published (see Wyatt, Potkin and Murphy, 1979 for a thorough recent review). There has been enough consistency in the reports of MAO levels to suggest that there is a lowering of the activity of this enzyme in some schizophrenic patients. The data get more complex when nonschizophrenic groups are also considered. There are reports

that alcoholics (Brown, 1977: Major and Murphy, 1978), heavy marijuana users (Still, Wyatt, Murphy and Rauscher, 1978) and individuals with bipolar affective illness have reduced MAO activity levels. College students with low MAO activity report more frequent psychiatric counselling and trouble with the law. Families of these individuals have eight times as many suicide attempts and suicide than families of individuals with high MAO activity (Buchsbaum, Coursey and Murphy, 1976).

Thus, neither does decreased platelet MAO activity appear to be a necessary factor in schizophrenia, nor is the lowering of MAO activity exclusive to schizophrenia. Various viewpoints have been taken in the design of experiments to clarify the relationship between MAO and schizophrenia. Some investigators, e.g. Buchsbaum and Rieder (1979) feel that there is enough evidenced to link MAO with some forms of schizophrenia and that the heterogeneity of the disorder obscures this link. Rather than conducting larger experiments to directly demonstrate this link, these experimenters have tried to reduce heterogeneity. This has been done by selective grouping of patients who share certain phenomenological characteristics, and comparing them to those who do not show these characteristics as well as to normal controls. A number of researchers (Carpenter, Murphy and Wyatt, 1975; Potkin, Cannon, Murphy and Wyatt, 1978; Domino and Khanna, 1976; Berger, Ginsburg, Barchas, Murphy and Wyatt, 1978; Sullivan, Stanfield and

Dackis, 1977; Berretini, Vogel and Clouse, 1977; and Murphy, Donnelly, Miller and Wyatt, 1976) have shown that low MAO activity is associated with chronic schizophrenia, rather than with the less severe, acute form of the disorder. Two sets of researchers (Carpenter, et al., 1975, Becker and Shaskan, 1977) have shown that low MAO activity levels are related to relatively more severe symptoms in inpatients.

Further separation of groups on the basis of symptoms has also been conducted. There seems, for example, to be a trend for schizophrenic patients with affective symptoms (described as "schizophrenia-related depression" and "schizo-affective schizophrenia") to have higher MAO activity than controls (Brockington, Crow, Johnstone and Owen, 1976; Joseph, Owen, Baker and Bourne, 1977; Schildkraut, Herzog, Orsulak, Edelman, Shein and Frazier, 1976; Orsulak, Schildkraut, Schatzberg and Herzog, 1978; van Kammen, Marder, Murphy and Bunney, 1978; Schildkraut, Orsulak, Schalzberg and Herzog, 1980) though Becker and Shaskan (1977) do not find this to be the case. Other groups (Schildkraut, et al., 1978; Meltzer, Arora, Jackman, Pscheidt, and Smith, 1980; Adler, Gottesman, Orsulak, Kizuka and Schildkraut, 1980) find auditory hallucinations to be associated with the decrease in MAO activity. There are several indications that lowered MAO is more common among patients with paranoid features (Carpenter, et al., 1975; Wyatt, Potkin, Walls, Nichols,

Carpenter and Murphy, 1978: Potkin, et al., 1978: Demisch, von der Muhlen: Bochnik and Seiler, 1977: Sullivan, Maltbie, Cavenar, Hammett, and Lister, 1978) though Landowski and Afeltowicz (1977) did not find a statistically significant difference in individuals with paranoid symptomatology.

There also has been some attempt to look at more subtle psychological characteristics of individuals with deviant MAO activity. Adler, et al., (1980) found that there is a positive relationship between MAO activity and social introversion in psychiatric patients. Schooler, Zahn, Murphy and Buchsbaum (1978), on the other hand, report that lowered MAO activity is correlated with sensation seeking, high ego strength, positive affect and increased socialization and activity in normal populations. Such characteristics are usually associated with mental health rather than with schizophrenia!

Thus the trend for current research in MAO is less directed towards attempts at demonstrating that this enzyme is a biological marker for schizophrenia, but rather at examining the relationships between deviances in this enzyme's activity in a variety of conditions in order to determine which specific dimensions or clinical characteristics it is associated with. Clearly there are individuals in both psychiatric and nonpsychiatric populations who can have low MAO activity. Indeed, if the data of Schooler, et al. are, then low MAO

nonpsychiatric subjects may show more characteristics linked with mental health than other normals.

Criticism of the evidence

In the evaluation of the literature suggesting the role of MAO in schizophrenia, several conceptual criticisms and their possible refutations should be considered. The vast majority of the experimenters have measured MAO activity in platelets that have been isolated from the peripheral circulation. MAO does not cross the blood-brain barrier, so peripheral MAO activity is not necessarily indicative of central activity. Indeed, one study (Winblad, Gottfries, Oreland and Wiberg, 1979) found no correlation between peripheral MAO and activity of this enzyme in the hypothalamus, hippocampus, caudate nucleus or cingulate cortex. It is generally presumed that the site of action of the substrate for psychiatric symptoms is the central nervous system. Does it then make sense to examine peripheral platelet MAO levels?

While this criticism must be taken seriously, several observations can be made regarding data related to these considerations. Several experimenters have indirectly investigated the relationship between central catecholaminergic activity and peripheral MAO. Wyatt, Potkin, Bridge, Phelps and Wise (1980) point out that eye-blink rates are decreased in low dopaminergic states such as Parkinsonism, and increased

in hyperdopaminergic states such as tardive dyskinesia. They also present reports that indicate that eye-blink rates correlate inversely with platelet MAO. Thus, as overlapping inverse relationships were found between central dopaminergic activity and peripheral MAO activity for eye-blink rates, this suggests a relationship between central activity and platelet MAO measures. In addition, Kleinman, Potkin, Rogol, Buchsbaum, Gillin, Murphy, Nasrallah and Wyatt, (1979) found a signficant correlation between platelet MAO and plasma prolactin levels in drug-free schizophrenics and normals with low platelet MAO. Plasma prolactin is under the inhibitory control of tuberoinfundibular dopamine. Again, this suggests a relationship between central catecholamines and platelet MAO.

Additionally, models exist of substances that act peripherally, eventually affecting brain function. Phenylketonuria (PKU) for example, is a disease of liver function, and results when abnormally high levels of metabolites cross the blood-brain barrier (Centerwall and Centerwall, 1972). Thus MAO levels may affect the levels of some other substance which crosses into the brain and produces psychiatric symptoms. Thus, there are bases on which the criticisms of this conceptualization may be refuted, although the evidence remains inconclusive.

Models of MAO and schizophrenia

Wyatt, et al., (1980) have observed an inverse correlations between urinary tryptamine excretion and MAO levels in chronic schizophrenic patients. It is possible that peripheral MAO affects, or reflects the effect of some other substance acting on tryptamine metabolism peripherally. Tryptamine easily crosses the blood-brain barrier where it can be converted to DMT a powerful hallucinogen by n-methylation. It has been suggested by other investigators (Rosengarten and Friedhoff, 1976) that DMT may be a substrate for schizophrenic symptoms. Thus, MAO would be one part of a system where several interactions take place to produce a particular psychotic picture.

Other investigators have suggested that decreased MAO may interact with some other physiological characteristic to produce the schizophrenic phenotype. For example, Wyatt, et al., (1979) point out that a higher proportion of schizophrenic patients are heterozygous for PKU than would be expected in the general population. Heterozygosity for PKU, and decreased MAO are traits that do not seem, separately, to have negative consequences for the organism. Perhaps it is their interaction as parts of a system that eventually results in the schizophrenic picture. The system may be complicated: perhaps more variables are involved, or perhaps the absence of ameliorative factors results in the disorder.

Within such a picture, the individual innocuousness of the heterozygous condition and lowered MAO, would allow these traits to remain in the population gene pool. Indeed the presence of lowered MAO activity, as mentioned before, may even provide some benefit to the individual. This advantage might increase the individual's likelihood of reproducing, and guarantee the maintenance of one contributing factor to schizophrenia in the population. Other interdisciplinary researchers have proposed models that incorporate not only physiological influences, but enviromental variable as well (e.g. Reiss and Wyatt, 1975). It is within such a conceptual framework that this dissertation has been designed.

Family Interaction Studies

Data derived from the vast field of family research defy the simple organization possible for the biological studies. A reading of the diffuse literature indicates that there are no basic theoretical constructs shared by the family researchers. The measures of interest vary greatly, their tie to the theoretical constructs is often ill defined, and there appears to be no consistent focus among studies in this area.

The bulk of the family research can be organized around two general methodologies: directly systems oriented, and experimentally oriented. The researchers involved in the systems oriented work such as Haley (1962, 1980) and the

Palazzoli group (Palazzoli, Cecchin, Prata and Boscolo, 1978) are primarily clinicians who develop their theories and constructs from their extensive experience with disturbed families. First, the work of Haley and Palazzoli will be briefly described and commented upon, followed by an examination of the experimentally oriented activity in this field.

Systems research

Jay Haley's early work on the family of the schizophrenic (Haley, 1959, 1962) is an example of a systems oriented approach. He bases his proposed model on examination of a sample of families participating in therapy. His approach is primarily descriptive, and is distinguished by his emphasis on the study of the entire family with a focus on their interaction with each other. His model is based on three essential elements: 1) the proposition that human communication can be classified into levels of message, 2) the assumption that each family has rules and government for the behavior of each individual in the family, and 3) the cybernetic model of a self corrective system.

He analyzed video and audiotape transcripts of sessions and found that certain interactive patterns are typical in schizophrenic families: a) family members consistently manifest an incongruence between what they communicate and how they qualify this at a different level of communica-

tion, e.g. mother stiffens when she says to her child "come here and hug me"; b) family members consistently disqualify what other members say. There is little mutual affirmation and each member's response is generally labelled as being "wrong" by another family member: c) no alliances made explicit are tolerated within the family. When in a three member system an alliance between two members is formed, it is generally against the third, and as soon as the third member labels it as such, it falls apart: d) typical patterns of dealing with blame exist. Mothers tend to defend against blame by transferring it to forces beyond their control; father deals with blame either by withdrawing, throwing temper tantrums or obscuring the issue; the identified patient either accepts all blame for everything wrong, or denies that anything is wrong.

In order to follow Haley's ideas more closely it is necessary to describe certain basic terms essential to his descriptions. Haley defines his terms primarily through example. Qualifiers: "Whenever anyone speaks to another person he must qualify what he says because he must speak in a tone of voice, with a body movement, with other verbal statements, and in a particular context." (Haley, 1959, p.362); Incongruence and disqualification: "If a mother makes a punishing statement while labelling what she does as benevolent she is disqualifying what she says, or manifesting

an incongruence between her levels of messages." (p. 362); Affirmation: "If mother says, 'I brought you some candy', and her son says 'You treat me like a child', the son is disqualifying his mother's communciation. If he accepts it with a statement of thanks, he is affirming her statement" (p. 362); Alliances: "In some families, father and mother may form a coalition against a child, in others the child may ally with one of parents against the other, and so on" (p. 362); Intolerance of alliances: "The mother and child may appear to form a coalition against the father, but should the child say 'Father treats us badly', mother is likely to say 'He has his troubles too', even though a moment before she may have been complaining to the child about how badly they were both treated by the father" (p. 366).

The schizophrenic functions in a family where disqualification is the rule. So his tendency to consistently behave in incongruent fashions is explainable in terms of learning within the family system. Psychotic behavior is also seen by Haley as a way of adapting to the demands of the environment when the family rule of disqualification conflicts with other rules of his environment. "It can be argued that psychotic behavior is a sequence of messages which infringe a set of prohibitions but which are qualified as not infringing them. The only way that an individual can achieve this

is by qualifying incongruently all levels of his communication." (Haley, 1959, p. 369).

In a more recent development of his concepts (Haley, 1980), Haley has reemphasized the importance of considering the individual's deviant behavior in terms of the family context. He describes his conclusions from years of work with young adults in a preliminary to describing intervention with the families. He describes deviant behavior on the part of a family member, particularly offspring, as the response to a family system threatened with collapse. He suggests that the parents in such a system have developed a relationship that makes the presence of and focus on an offspring essential. As the offspring develops competence on the path to eventual separation from the family and establishment of an independent adult life, the family system is faced with the prospect of a need to change the parents relationship with each other. While most families can accomodate to the change in the system which occurs when an offspring separates, in some families the prospect of conflict between and separation of the parents threatens the existence of the family unit. The offspring solves the problem by exhibiting deviant and "incompetent" behavior, which serves both to unify parents, cementing these roles in the system, and to make the prospect of the individual's departure from the system less likely.

The individual learns how to behave within the family

system, according to the views of Haley. However it is worth noting that this "learning" is not equivalent to a situation where deviant behavior is modelled and receives reinforcement. The emphasis is rather on adaptive and homeostatic (i.e. contributing to a steady maintenance of a system) functions served by the deviant behavior. From another perspective, the patient's recovery would not be expected to follow upon withdrawal of reinforcers for the behavior. Rather the behavior is seen as way of maintaining the roles and relationships which exist within the family unit.

The Palazzoli group (Palazolli, et al., 1978) also present a systems model of schizophrenia. These authors believe that it is most appropriate to view the behaviors of the members of a family as manifestations of the family as a system governed by rules. The rules operate to maintain the homeostasis in the family, and are peculiar to the pathology of the family.

The group traces the development of schizophrenic behavior in an individual as the result of three generations of family interactions. The grand parents of the schizophrenic offspring start the process by creating a family environment where approval is equated with weakness. Consequently the parents of the schizophrenic individual come into their marriage equating approval of other with a loss of prestige and authority, but incorporating "an enormous desire to

receive confirmation, a desire all the more intense as it is chronically frustrated" (pp. 22-23). In order to balance the search for authority with an inability to express approval, a "game" is established. Each member is allowed in turn to believe that he or she <u>really</u> has the authority in the family, but this belief must be kept secret, because upon explicit recognition, the other members act to subvert it.

The "game" is maintained through paradoxical communications. These consist of message about relationships that both make a statement about the nature of the relationship, and deny the statement. A further explanation from the text follows:

> "(The paradox is) suited to transmitting and maintaining a challenge which presents no way out, and no possible end. Such a communicational mode can be summed up in the following way: on the verbal level an injuction is made which on a second level (usually nonverbal) is disqualified. At the same time another message is given that it is forbidden to make comments, that is, to metacommunicate on the incongruence of the two levels, and that it is forbidden to leave the field. Such a move obviously does not allow the person who receives the injunction to adopt a complementary position (through obedience to the injunction) since it is not clear what he has to obey." (p. 31)

Thus the homeostasis in the family of schizophrenics can be described as one where no member is allowed to be in control, but this rule is not made explicit. All members act to convey to the others, the other's lack of ability to control the definition of relationships in the family. All members of the family cooperate in not making these rules

explicit. The schizophrenic's behavior is a special case of this. This family member is conveying both the other's lack of control over his or her behavior, and is disqualifying the authoritative position that such a comment would give him or her in the family.

Experimental and systems research involve two different paradigms. It would not be appropriate to critique the systems research from the point of view of the requirements of an experimental paradigm. However the difficulties in integrating the paradigms deserves comment.

At least three major differences set apart the work of systems and experimental researchers. As theoreticians and clinicians, the systems researchers rely heavily on their own clinical skills and intuition in the measure of particular important constructs, e.g. some degree of clinical sensitivity and experience are essential for the recognition of alliance shifts and disqualification. The measures taken by experimentalists rarely require these kinds of skills which may vary greatly from experimenter to experimenter. Related to this difference is the lack of emphasis placed by the systems researchers on the operationalization of their measures, most of which are thought to be intuitively obvious. Experimentalists, emphasizing reliability, insist on explicit operationalization. Finally, the systems theorists are more interested in description than quantification.

They depend upon content analysis of long sequences, looking for the presence of incongruent messages and disqualification which do not always come in discrete quantifiable units.

The systems researchers study the three dimensional system of family relationships: they consider the responses of members to the other memebers, and the others' responses to their responses, etc., and integrate this into models of etiology. Their primary interest is to devise strategies of intervention, and to change dysfunctional patterns. This makes their descriptions of family interaction of great importance to clinicians. But as their paradigm and the experimental research paradigm are epistemologically different, they can only be integrated peripherally, if at all.

The experimental data

These data can be roughly organized along a variety of dimensions. Jacob (1975) and Doane (1978) provide two recent contrasting reviews of the literature, organizing the data along different dimensions and coming to radically different conclusions about the validity of the research. This review organizes along the four dimensions of Chaos/ Inefficiency, Power Structure, Individuation Issues and Communication Patterns. An attempt has been made to relate thc data to theoretical constructs, some of which have been developed and elaborated by the experimenters. This organi-

zation and review serves as the springboard for the family interaction experiments designed in this study.

Chaos as an abnormal characteristic. Intuitively, one conceives of abnormal families as being chaotic, i.e. having a lower degree of efficiency in solving life's challenges and a higher degree of conflict between members. In addition, it can be hypothesized that there is less sharing of values and opinions between family members. While reliance on purely intuitive variables in forming a theoretical model is undesirable, these variables can be formulated and empirically tested before their incorporation or rejection in relation to a model of family interaction.

Efficiency of family function has been tested by providing families with tasks requiring group resolution of differences. A number of experimenters have found that schizophrenic families are less effective problem solvers when group functioning is involved compared to normals (Reiss, 1967; Reiss, 1968; Reiss, 1969; Mishler and Waxler, 1968). Ferreira, Winter and Poindexter (1966) and O'Connor and Stachiowak (1971) found that abnormal, poorly adjusted families (with diagnoses not limited to schizophrenia) were less efficient than normal families. Farina and Holzberg (1968) and Schuham (1970) found families with borderline or schizophrenic offspring to have greater difficulty reaching agreement in their group resolution tasks than normals.

Some experimenters, however, do not find differences in problem solving measures between schizophrenic and normal control families (e.g. Wild, Shapiro and Goldenberg, 1975). Different types of measures of family function and efficiency were used by the various experimenters, and may be responsible for some of the discrepancies in results. In addition, there may have been differences in inclusion criteria, and the subjects may not be from the same population.

Is there greater conflict between family members when an offspring is schizophrenic? Two studies seem to support this hypothesis. Caputo (1963) defining increased conflict as greater frequency of disagreement and greater rated expression of hostility, found that parents of schizophrenics show greater conflict than parents of normals. Farina and Holzberg (1968) also report similar results. One study (Schulman, Shoemaker and Moelis, 1962) did not find greater conlict between parents, however their criteria for defining conflict seem to be considerably more rigid and extreme than those of the researchers mentioned earlier.

It is difficult to measure the sharing of values and beliefs. The Ferreira Winter questionnaire, filled out individually by family members, attempts to provide one such measure. It consists of a number of items to be rated preferentially as proposed courses of action in the face of a variety of specified situations. As the members fill out

the questionnaire separately, a measure of spontaneous agreement in the family can be taken, Ferreira and Winter (1968) find that families with normal offspring show higher spontaneous agreement than families with disturbed offspring, and, regardless of age, the normal child shows greater agreement with his parent than the disturbed child. Other experimenters using different measures have also found greater agreement between members in normal as compared to disturbed families (Haley 1967; Schuham, 1972).

Thus, there is some evidence that families that have abnormal offspring show a lower degree of group function efficiency, a higher amount of parental conflict, and a lower amount of agreement on a variety of issues. However there is no evidence that chaos plays a causal role in the child's pathology.

It is interesting, however that in one process measure of "chaos", i.e. degree or frequency of interruption of one another by family members, schizophrenic families show lower scores than normals (Lennard, et al., 1965). Mishler and Waxler (1968) also report more interruptions in normals than in families with a schizophrenic offspring. While many interruptions can be an indication of a chaotic disturbed family with no clear decision-making base and confused direction, they also reflect a flexible family where power is well distributed among family members and disagreement is

allowed and tolerated.

Family power structure. The distribution of power in the family is an important systems concept that has received much attention in the clinical family literature. In addition some schizophrenia theorists, such as Fromm-Reichmann suggest that power distribution between parents plays a role in the etiology of schizophrenia (Doane, 1978). The father is postulated to be weak, passive and ineffectual, and the mother as dominating and controlling.

There have been some empirical investigations of distribution of power, the flexibility of this distribution, and the kinds of coalitions between family members in disturbed and normal families. One way that dominance in the family has been measured is by individual rankings on group choice fulfillment. For example, after the Ferreira-Winter questionnaire has been individually administered, the family is instructed to fill it out as a group. The extent to which an individual's separately stated preference appears as the family's preference is taken as an indication the comparative degree of dominance of the individual in the family. A similar approach consists of having family members solve a task separately and together. Strategy choice can then be compared. Wild, et al., (1975) found that in schizophrenics' families, dominance seems to be rigidly defined by role rather than randomly distributed over individuals, or determined by

which member is the most competent in the situation. Fathers of schizophrenics tended to dominate in strategy choice in the problem solving task and preferential alternative in the Ferreira-Winter questionnaire. In normal families the most competent dominated in strategy choice, and there was a more even distribution of choice fulfillment on the questionnaire (Ferreira and Winter, 1968).

Cross-generation coalitions in normal and abnormal families have also been studied, with the hypothesis that, in normal families, parental coalition will be the strongest, while in disturbed families various parent-child coalitions will dominate. While a skilled clinician working with a disturbed family will readily recognize coalitions and their shifts, coalitions are obviously difficult to measure directly and researchers have had to rely on indirect methods. Cheek (1964) found that mother-child agreement on a discussion task was greater than agreement between parents and father-child agreement in families of schizophrenics. Mishler and Waxler (1968) postulated that those in coalition would be most likely to speak in sequence to each other. Using this measure of coalition they found that in normal families there were more mother-father coalitions than in schizophrenics' families. One study (Haley, 1962), however, reports more frequent parental coalitions in families of schizophrenics. Haley's measures were taken during a "game"

where individuals had to cooperate with another family member to accumulate points. But they could not stay in cooperation as each member of the "coalesced" pair made the same number of points, while the object of the game was to win. The discrepancies in the results may be due to the different measures used.

Thus, while dominance patterns seem more rigid and role dependent in families of schizophrenics, coalition patterns have not been reported consistently as following a particular pattern. Again, there may be a methodological basis for the discrepancy, as different measures of coalition were used.

Individuation issues. A number of theoretecians (DeWitt, 1979) have described the schizophrenic individual as having flimsy ego boundaries, being undifferentiated and symbiotically involved in his or her family, and consequently more defined by family rules and agendas. One family dynamic suggested as being the basis for this situation is the lack of intimacy between parent as a result of their own ego deficits. The father is seen as distant and dominating, and it is postulated that the mother tries to obtain intimacy from the child instead of the husband. The mother responds to the threat of separation from the child upon the offspring attaining adulthood by undermining the child's efforts (DeWitt, 1979). Demonstration of these concepts is difficult and indirect data are necessary. The prevalence of mother-child

coalitions and of marital discord in families of schizophrenics, discussed in the last section, however, provides some indirect support for this proposal.

Some researchers have attempted to approach the symbiosis/individuation issue more directly. They derive their choice of methodology from the postulate that the relationship which occurs between parent and child is important in the etiology of schizophrenia. They hypothesize that offspring are expected to gratify parents' emotional needs in families of schizophrenics. Walsh (1979) studied Thematic Aperception Test (TAT) productions in normal, schizophrenic and non-schizophrenic psychiatric families, paying attention to the occurrence of "child as mate" and "child as parent" themes. She hypothesized that these would occur more frequently in the fantasy productions in schizophrenic families. She also conducted conjoint administrations of the TAT cards, in order to observe the responses of other family members when a member introduced such a theme. No significant differences in frequency of "child as parent" theme evocation emerged between the three groups. However "child as mate" was a frequently introduced theme by all family members in schizophrenic families. These were rarely elicited in control families, and when such a theme was introduced by a control family member, the other family members rejected it.

Wild and Shapiro (1977) provide additional data on in-

dividuation from a different perspective. They first tested individual family members on a problem solving task so that indiviual strategy and skill could be assessed. Then the family was given the task and asked to solve it together. They found that the identified patient performed better individually than in the family group. Even when he had used the most efficient strategy in the individual sessions he was reluctant to compete with the other members in strategy selection, and the fathers dominated the group decision. Wild and Shapiro conclude:

> "when the son has learned a skill and demonstrated his competence outside the family, . . . the family cannot tolerate this divergence and foster the son's growth and separation from the family. Instead, the family's equilibrium may be maintained at the price of having the young adult son remain in the role of a child." (p. 55).

Communication patterns. The term "communication deviance" was coined by Singer and Wynne (1963) and refers to defects and deviations in the communications of parents of schizophrenics. It emphasizes "the state of engagement, orientation . . . and shared attentional processes" (Singer and Wynne, 1966, p. 262) in the family. They have related a style of deviant communication based on the parents' productions on projective tests to thought disorders in the offspring. They postulate that in a family where these deviances exist, normal ego processes relying on communication between family members are disrupted and thought disorder results.

They further postulate that in families with schizophrenics offspring, communication is disturbed at the attentional level, i.e. family members have difficulty in focusing and sharing attention on any task at hand, while in other neurotic disorders, the disturbance comes after attention is shared. They distinguish two types of deviances in communication: "amorphousness", where global, undifferentiated thought is present, and "fragmentation", where some degree of differentiation is present, and failures in shared interpretation form the essence of the deviance. The former, a more primitive deviance, they consider typical in families of schizophrenics with poor premorbid history, while the latter may be more typical in nonpsychotic disturbed families, or in families of those schizophrenics with good premorbid history.

Singer and Wynne have published several experiments relating to this theory. Using the Rorschach and the Thematic Aperception Test (TAT) as the bases for verbal productions, they found that they could discriminate between parents of schizophrenics and those of neurotic offspring (Singer and Wynne, 1963, 1965). Predictions of severity of index symptomatology made blind from the typed transcripts of the parents' protocols were highly accurate. Morris and Wynne (1965), using recorded family therapy sessions, were able to predict diagnosis of offspring on the basis of parental

communication style. Using the Object Sorting Test, Wild, Singer, Rosman, Ricci and Lidz (1965) could distinguish at 80% accuracy level between parents of normals and schizophrenics. The Singer and Wynne group has published a number of additional experiments that support the importance of communication deviance in schizophrenia (Singer, 1964; Wynne, Singer and Toohey, 1976; Wynne, Singer, Bartko and Toohey, in press; see Doane, 1979, for a more extensive review of their studies).

Reiss (1969), Waxler (1972), and Liem (1974) report somewhat different results. Their findings suggest that there was greater communication deviance in the offspring, rather than in parents. This is probably due to their using somewhat different tasks around which they measured communication. Liem (1974) used an object identification task, for example, while Singer and Wynne (1963, 1965) tend to make their measurements from interviews and Rorschach productions. The latter situations are clearly less structured, and it is possible that they may elicit more communication deviance.

Wild and her group have also studied communication deviance in the family, focussing on the entire transaction rather than on the parental dyad alone. Shapiro and Wild (1976) asked family members to individually write down what the family had agreed upon on the group administration of the Rorschach. They scored along the dimensions of consen-

sus, clarity and compexity and found that families of schizophrenics and normals could be discriminated on the basis of family scores from these measures. Wild, et al., (1975) using 20 Questions (a cognitive problem solving task) and the family group Rorschach found that in the family situation, mothers of schizophrenics tend towards amorphous communication (defined as the number of times they failed to grasp the task set initially or lost the set during the task). Fathers, on the other hand have a need to put quick closure on tasks, precluding discussion by the family regarding their choice of strategy. This was replicated and expanded in a later experiment (Wild and Shapiro, 1977). They found that in families where the schizophrenic son functions better outside the family group, mothers had a great deal of amorphous attention difficulties, and father had the tendency for premature closure.

These studies have been conducted on families after the appearance of schizophrenia in the offspring. It is therefore possible that the parents' communication deviance arises as a response to the offspring's disorder, rather than that the deviance acts as an etiological variable preceding the disorder as suggested by Wild, et al., (1965).

Liem (1974) attempted to test these relative possibilities. She tested 11 pairs of "normal" parents and their sons, and 11 schizophrenic son and their parents, in a

communication task. All subjects functioned once in the role of communicators, and three times in the role of respondents. As communicators, they made tapes describing a common item. As respondents, parents listened to tapes made by their own sons and also to tapes made by other normal and schizophrenic sons. Sons listened to tapes made by their own parents, and other parents of both normal and schizophrenic sons. Both communications and responses were coded for deviance. Liem found that: (i) the communications of parents of schizophrenics were not significantly more disordered than those of normal parents, and did not adversely affect sons' responses, and (ii) the disordered communications of schizophrenic sons had an adverse affect on their own parents, and on all parents who tried to respond to them. Liem believes that these results go against the theory placing parental communication deviance in an etiological role for the development of schizophrenia in the offspring. However, as she also points out, it is not clear that parents and sons are responding to other individuals as they would to their own family members, or that the response to a short disordered communication essentially resembles the effects that result from living with an individual who expresses disordered communications over a long period of time.

The "cause and effect" problem really applies to all the data which indicate differences between families of

schizophrenics and families of controls. In order to resolve this problem, longitudinal studies which observe family interaction before the symptoms appear, and follow the family must be conducted. Meanwhile, it is more appropriate to consider these differences as correlating with the presence of schizophrenia in the offspring, rather than being etiological in nature.

Conclusion

So, how does one evaluate the field of family research? Is the experimentation methodologically unsound and the conclusions immaterial and conflicting, as Jacob (1975) suggests in his review, or are there "pockets of consistency" providing some dimensions along which disturbed and normal families can be differentiated, as suggested by Doane (1978) in her review? While a fair amount of the data is marked by inadequate methodology and final conclusions are not warranted at this time, the hazy outlines of family interaction are beginning to emerge and take form.

The lack of longitudinal data make the relationships between these differences and the appearance of schizophrenia in the offspring, unclear. The differences may or may not be etiological in nature, as they may or may not have preceded the disorder. By the same token, they may or may not be responsive in nature. However, it is possible to

make hypotheses about current interaction patterns in families of schizophrenics vs. families of nonschizophrenics.

As the review suggests, there seems to be more parental conflict, more frequent parent-child coalitions and rapidly shifting coalitions between all members, in disturbed families. The power structure is rigid and heirarchial in these families, rather than firm but distributed in a more flexible fashion as seems the case typically in normal families. A schizophrenic child is often more effective outside the family environment, and for some reason is unable to contribute this efficiency to family function. As opposed to in normal families group function in disturbed families tends to be lower than individual function. Further deviance seems to be at the level of focussing attention on whatever task is at hand. It seems that in disturbed families, mothers in particular have difficulty in focussing their attention on the task at hand, while fathers have a high need for closure, and an inability to appropriately process and use input from the rest of the family. Moreover, schizophrenic families in general seem to lack the ability to simultaneously focus their attention on a common task.

Statement of the Problem

In summary, neither the family nor the biological literature offer conclusive evidence on the etiology of schizo-

phrenia. The family literature suggests some interaction patterns that appear to be related to schizophrenia, but these studies suffer methodological problems that compromise their findings. The biological literature indicates that MAO activity is low in some subgroups of schizophrenics, but low MAO activitiy is not limited to schizophrenia. Finally, few experimenters have been interested in the relationship between biological and family interaction variables, in spite of the fact that it is clear that both these variables are important in the development of the disorder. With this background in mind, a three-part study employing several levels of investigation was designed.

The first part of this study is an investigation of some substantive and methodological issues in family interaction in schizophrenia. Substantive issues derived from the literature include the following: Do families of schizophrenics have distinctive interation patterns? Can the past findings on families of male schizophrenics be replicated? What patterns exist in families of female schizophrenics, and single parent families with a schizophrenic patient? This study investigates these questions.

Families of male schizophrenics, according to the best designed experimental studies in the literature (i.e. those conducted by Cynthia Wild and her group), have been found to have more rigid patterns of dominance, and more

deviations in communciation patterns. Whether these findings can be replicated, and the form which these variables take in families of female patients diagnosed as schizophrenic, and single-parent families, will suggest the effect of social and structural factors on patterns in the families of patients with psychiatric diagnoses.

An attempt was made to avoid the methodological drawbacks of previous studies. In the context of the experimental guidelines set out in Chapter 1, this study differs from previous studies along the following dimensions:

a) An attempt was made to increase experimental control. With regard to Jacob's (1975) suggestions for proper control, ratings were done blind: agreement between individual raters were obtained; data from male and female patients were analyzed separately; experimental and control groups were run in the same setting; and experimental and control groups were equivalent in secondary status (hospitalization). Estimates of I.Q. scores, socioeconomic status levels and age of parents and offspring were obtained. This was in order to control for any potential differences on these variables between the control and experimental groups.

b) Research Diagnostic Criteria (Spitzer, Endicott and Robbins (1975) were used to assign patients to schizophrenic and nonschizophrenic groups. Thus, unlike in many past experiments, families of schizophrenic were analyzed separ-

ately from other "abnormal" families. In addition, by reference to these criteria, a description of this relatively homogeneous group of schizophrenic patients is available for comparison of the results with other studies.

c) No "intuitive" concepts were used in the sense that all measures were based on operational definitions. No unquantifiable measures were used.

d) In order to explore construct validity, simultaneous measures of various attributes of family functioning, were taken to allow for any patterns of interaction between these variables to emerge. Finally, a number of methodologies were simultaneously employed, to ascertain whether different methods of measurement would yield consistent data.

There has been little attempt in the past to demonstrate the reliability between these measures, or to relate them to the underlying construct in other independent ways. It is hypothesized that within each category (effectiveness, impact of family on individual, communication deviance, and dominance patterns), across methodologies, there would be strong correlations between the measures. Relationships between categories also potentially provide useful information about family function. For example, if efficiency relates strongly with dominance scores, this would suggest that the system, adaptively, allows the most effective to have the most influence on family functioning. Other re-

lationships would suggest different possibilities, providing hypotheses that could be further tested.

The methodology of this study falls closer to a linear than a systems approach. Measures are made on individuals, even though they are interacting with and responding to other family members. These are linear measures because it is the individual's behavor rather than the interaction between family members that is recorded. This linearity allows an emphasis on reliability and direct observability of measures. The cost of this emphasis is that some meaningful systems interaction will be lost. The gain, essential in a study employing several levels of investigation, is the possiblity of integration with other data.

The second aspect of this study is an investigation of biological parameters. MAO levels have been examined, in the past, in medicated or drug-free patients who have received neuroleptics in the past. It is becoming increasingly clear that neuroleptics affect MAO levels (Jackman and Meltzer, 1980). Since MAO is under genetic control (Wyatt, et al., 1973), the study of parents' MAO may provide a strategy for examining this process. In the model of "high risk" studies (Buchsbaum, Coursey and Murphy, 1976), this study investigates biological attributes of individuals related to schizophrenics, but not currently showing the disorder. This aspect of this study was designed to in-

vestigate the possibility of differential MAO activity patterns in parents of schizophrenics vs. parents of controls. One of the difficulties with the early biological research was the lack of rigorous and consistent diagnostic criteria across laboratories, and a resulting confusion when extremely discrepant results were reported. In this study, in order to avoid this problem, Research Dignostic Criteria (Spitzer, et al., 1975) were used to assign subjects to groups. These criteria tend to exclude the "reactive" form of schizophrenia. Consequently, subjects who early in the course of psychosis show schizophrenic symptoms and later develop a different disorder, or show these symptoms briefly only, are excluded from the schizophrenic category, and the homogeneity of the group increases. There are indiciations that genetic factors play a larger role in process (chronic) rather than reactive (acute) schizophrenia (Kety, et al., 1968, 1975). MAO activity has been linked to chronic rather than acute forms of the disorder. Thus, as MAO is under genetic control, and the identified patients in this study are likely to be on the process end of the continuum, it is likely that at least one of the parents will carry the gene for decreased MAO activity, compared to the "normal" MAO activity range.

The final part of this study is an investigation of the relationship between the biological and family interaction

factors. Do MAO activity levels of parents correlate with aspects of their and the family's behavior in the group situation?

As there have been virtually no previous studies considering these levels simutaneously, the relationships found should prove illuminating. Several possible relationships could exist between these two sets of factors. These may lead to suggestions of possible biological/family interaction models of schizophrenia. The process of relating the data to models is exemplified below, with A considered a family vulnerability factor, and B a biological vulnerability component.

If it were found that in families that produce schizophrenics, parents have low MAO levels (A) and high attention deviance scores, (B) this would suggest that the environmental factor contributing to vulnerability interacts in an additive fashion with the biological factor (an A + B model). In such a model, finer relationships regarding the combination could emerge, suggesting different weights for each of the additive factors. On the other hand, if it were found that in families of schizophrenics, one of these factors is always deviant, i.e. the MAO activity levels are very low or the attention deviance score is very high, this would suggest a model that proposes that either the biological or the family deviance alone is sufficient to produce

the disorder in the family (an A or B model). Yet a different model may be suggested if it were found that attention deviance scores are high in both nonschizophrenic and schizophrenic families, but MAO levels are low in schizophrenic familes alone, or in control families that do not have high attention deviance ratings. Now it would seem likely that the diathesis of low MAO is the necessary factor and interacts with the sufficient factor of attention deviance. In this model, the stress of B would be necessary, but would not produce the schizophrenic symptoms without A.

The value of simultaneously considering several potential sets of etiological factors for schizophreia is that even if clear-cut relationships such as those suggested above do not emerge, the abundant data can be further scrutinized to suggest hypotheses that may not currently be under investigation. This would then serve to suggest directions for further research involving both family and biological factors in schizophrenia.

C H A P T E R I I I

EXPERIMENT I: FAMILY INTERACTION VARIABLES IN SCHIZOPHRENIA

Method

Subjects

The families as referred to in this design are two-generational triads or dyads of parent(s) and schizophrenic patients, or hospitalized controls. These subjects were recruited from the psychiatric ward of New York University Hospital and Bellevue Psychiatric Hospital. The criteria for inclusion in this study were a) availability of an English speaking biological parent under age 70, b) absence of indication of brain damage in the patient. On every occasion that such a patient came to the attention of the experimenter, the physician attending the patient on the ward was contacted and permission was requested to approach the patient and family about participation in the study. On occasion, permission was denied because the physician believed that the patient was too disorganized to participate in a study, or that the testing would interfere with the patient's treatment. If permission was given, the patient and the family were approached about participation on a volunteer basis in the study. Approximately 30% of the patients and families contacted were unwilling to participate in the study. Another 10% withdrew from the study before the data were collected.

Approximately a third of the families participating in the study were recruited from Bellevue Psychiatric Hospital. The rest had been hospitalized at University Hospital. High and low socioeconomic levels were represented in both groups. Five families in the schizophrenic group, and five in the control group were black. Two families in the schizophrenic group and one in the control group were Hispanic. The rest were white. The majority of families were from New York City, although a small number were from Connecticut and New Jersey. The patients ranged in age from 14 to 39 years, with a mean age of 22 years and 11 months. The parents ranged in age from 31 to 69 years, with a mean age of 52 years and 5 months.

The majority of patients were receiving neuroleptic medication at the time that they participated in the study. No patient was tested during a period of extreme disorganization. All testing began while the patient was still in the hospital, usually during the last week of hospitalization. In the majority of cases, the patient was still in the hospital when testing was completed, although on a small number of occasions, the patient and family were tested shortly after the patient was discharged. The typical duration of patient hospitalization was four weeks.

Before the testing began the individuals were informed of the research purposes of the study and its goals for

gaining increased understanding of families in order to eventually improve patient treatment. They were told of the time requirements of the study, that the interaction procedures were not noxious or intrusive, and their consent to the procedures were requested.

Four experimental groups were formed: single parent/male identified patient (i.p.); single parent/female i.p.; parental dyad/male i.p.; and parental dyad/female i.p. Four parallel control groups of nonschizophrenic psychiatric patients were also formed. Assignment to single parent vs. parental dyad categories was based on the number of biological parents present in the permanent household of the offspring. In all cases but one, the single-parent in the study is the mother. A breakdown of number of families in each condition appears in Table 1.

Table 1

Breakdown of Families in each Condition

	Single-Parent		Two-Parents	
	Male Patient	Female Patient	Male Patient	Female Patient
Schizophrenic Patient	4	6	7	7
Control Patient	7	7	4	4

All patients were diagnosed according to Research Diagnostic Criteria (RDC) (Spitzer, et. al., 1975) after family

testing was completed and protocols were scored, in order to determine their diagnostic group. Control patients fell into the following diagnostic categories: major depressive disorder(6); minor depressive disorder(3); bipolar depression with mania(5); manic disorder(1); drug use disorder(1); generalized anxiety disorder(1); alcoholism(1), and other psychiatric disorder(4). All the patients in the latter category do not fit RDC criteria for any other disorder and had received diagnoses of adjustment reaction to adolescence.

Procedure

Testing was conducted over a number of sessions at the mutual convenience of the experimenter and subjects, with the requirement that all individual testing be completed before family testing began. Individual testing was usually conducted for all family members on the same day, and the family was brought together for one occasion, shortly after joint testing.

Each family member was seen individually for approximately one hour of testing when the following procedures were administered:

1. The vocabulary subtest of the Wechsler Adult Intelligence Scale (WAIS).

2. The Biographical Data Form.

3. The 20 Question Task.

4. Rorschach Cards, I, II, and VIII.

5. The Ferreira-Winter Qestionnaire.

During the family testing, the family members were seen together, and the procedures below administered:

1. The 20 Questions Task

2. The Family Group Rorschach

3. The joint Ferreira-Winter Questionnaire

The vocabulary subtest scaled score gave a general measure of intelligence. The biographical data form provided information about the age of the subjects, and family socioeconomic status (SES). The occupation of the head of the household was converted to an SES level according to the Adult Personal Data Inventory (U.S.H.E.W., 1976). These data allowed the determination of the presence of consistent differences between groups on the control variables of I.Q., age and SES.

Tests and scoring.

Instructions to subjects and details of scoring can be found in the appendix. Tests and measures will be briefly described here, and scores are summarized in Tables 2 (p. 64) and 3 (p. 69).

The 20 Questions Task. This test has been used by Mosher (1966) to measure level of concept formation in

children. It was adapted for use in an interactional setting by Waxler (1974) and Wild and Shapiro (1977), whose procedures for administration and scoring were used in this study. Each family member did this task individually and in interaction with the family. The individual (or family) was shown a chart with 42 colored pictures of common objects on it and instructed to determine which picture the examiner was "thinking of" by asking questions which could be answered by "yes" or "no". The subjects' performance during individual and family sessions provided individual and family measures which gave information about interaction patterns.

The Family Group Rorschach. This test adapted from the work of Loveland, Wynne and Singer (1963), was developed as a relatively unstructured and unfamiliar task through which family communciation patterns could be studied. An individual standard administration of cards, I, II, and VIII of the Rorschach is first carried out. In the family session, the patient and parent(s) are brought together and instructed to determine, as a family, what the blot could be. They are asked to each write down the response and circle the area of the blot on which the response appears on a Rorschach location chart. The written and location chart responses were scored for communication deviance.

The Ferreira-Winter Questionnaire. This test consists of 17 hypothetical situations which each family member in-

dividually completes, choosing and rating the three most preferred alternatives as well as the least preferred alternatives. During the group session, the family was instructed to fill out certain of the items again, but this time as a family, that is to say with the understanding that their choices are meant to represent a family decision. They would, therefore, discuss among themselves the matter of their choices and fill out certain of the situations in the questionnaire again. This test provided family structure indicators.

Table 2 (p. 64) summarizes the 17 measures derived from the above tests.

Interrater reliability on measures. Test administration and scoring were performed by three trained assistants. Prior to beginning scoring, interrater reliability levels were established on sample protocols. The assistant who scored the majority of the protocols began scoring after obtaining a correlation of approximately .9, on an act-to-act basis, with a rater familiar with the scoring, but not involved in the scoring on these protocols. The other two assistants established reliability with this assistant prior to beginning scoring.

After the data in this study were gathered, one assistant scored four protocols that had been scored by a different rater, and were chosen at random. This scoring was done

Table 2

Summary of Scores from Individual and Family Data

Score	Description
	20 Questions Task
(i)[b]	Number of questions asked in individual session
(ii)[b]	Total questions asked of examiner by family (F)[a]
(iii)[c]	Family's score compared to the individual's score
(iv)	Proportion of questions that were abstract in individual session
(v)	Proportion of questions that were abstract in family session
(vi)[c]	Proportion of abstract questions in family session compared to proportion in individual session
(vii)	Frequency of amorphous behavior during family session
(viii)	Frequency of correction of another member's amorphous behavior
(ix)[d]	Questions suggested by individual but not chosen by family
(x)	Questions suggested by individual, discussed by family, and asked
(xi)	Questions spontaneously asked by individual without discussion with other family members
(xii)	Questions initiated by individual and asked of examiner as a proportion of total number of questions initiated
(xiii)	Proportion of family's total questions asked of examiner that were initiated by this individual
	Rorschach Cards
(xiv)[e]	Composite Rorschach communciation clarity score (F)[a]
	Ferreira Winter Questionnaire
(xv)	Spontaneous agreement of family members before discussion (F)[a]
(xvi)	Individual's choice fulfilment score
(xvii)	Family's mean choice fulfilment score (F)[a]

a: scores followed by (F) are family scores. All members of the same family receive an identical family score
b: relates inversely to efficiency
c: positive scores indicate improvement in family context
d: relates inversely to dominance
e: relates inversely to communication deviance

from written transcripts of the sessions. All the independent scores (i.e. those that are not composites of other scores) that required translation from the session to a score, were compared for interrater reliability. The correlation coefficients, based on data from 10 subjects, are as follows: Proportion of constraints (iv): .91; amorphousness (vii): .18; correction of amorphousness (viii); -.22; questions suggested by individuals but not chosen by family (ix): .69; questions suggested by individual, discussed by family and asked (x): .98; questions spontaneously asked without discussion with other family members (xi): .99; and Rorschach score (xiv): .99.

On measures iv, ix, x, xi and xiv, the reliabilities are high and compare favorably with those of Wild, et al. (1977). However, on measures vii and viii, reliability was unacceptably low. The rescoring on which the reliability was based was conducted from a written transcript. Original scoring was conducted by raters who had been present in the family session on the basis of tapes made of these sessions. Subtle verbal cues may have been missed in the transcription and could account for the discrepancies.

In order to explore this possiblity, audiotapes made of the family sessions were rescored. This was done for four new families, and only for those measures on which a low

reliability had been obtained. On the basis of audiotape scoring, reliability between raters increased to .99 for measure vii and .46 for measure viii.

Organization of scores into categories. The measures obtained from the tests above were organized to give information about aspects of family functioning in the following way:

Efficiency scores: (i), (iv) and (v) between and within groups; (ii) between groups. The number of questions asked by subjects during their individual testing sessions (i) give a measure of their individual efficiency. Between-group comparisons give information about whether differences exist in different groups when the individual family members are working separately. Comparisons of the patients' scores between groups gives information about whether individual patients, when functioning outside their families were differentially efficient according to their groups. And finally, within-group comparisons of patients vs. parents gives indication of relative efficiency within the family. The same within- and between-group comparisons regarding the individuals' abstraction scores (iv) and (v) provides information regarding sophistication of cognitive strategy, the family efficiency score (ii) provides information or relative efficiency of families across groups.

Family structure scores: (x), (xii), (xiii) and (xvi) within- and between-group: and (xv) and (xvii) between groups. The number of questions initiated by a family member but not asked by the group (ix) provides the measure of rejected contribution, thus relating inversely to dominance of individual family members. The two dominance ratios (xii) and (xiii) provide information about relative contribution of the individual family members to the family's 20 Questions Task. The individual's choice fulfilment score (xvi) provides information about the degree to which the individual family member influences the family towards his or her choice. In all of the above, except (xiii), between- and within-group comparisons should prove illuminating, as should comparisons of generational levels across groups. The family's spontaneous agreement score (xv) gives an indication of relative levels of homogeneity of opinion in the family, and will suggest differences in these levels between diagnostic groups. The family choice fulfilment score, also meaningful to consider between groups, gives information about the families' ability to function while incorporating needs of different members.

Impact of family on individual scores: (iii) and (vi) within and between groups. These change scores, measuring the impact of the family on efficiency and cognitive strategy, suggest how the family affects the problem solving ability

and the capacity for abstract thinking in its members. These scores will provide interesting within- and between-group comparisons.

Communication pattern scores: (vii), (viii), (xi) and (xii), within and between groups. Amorphousness (vii), correction of this difficulty by another family member (viii), premature closure (xi), and the composite score for productions on the Rorschach (xiv), are all indicators of communication patterns in the family. The latter, a family unit score, will give an indication of differences between groups. The three former scores will provide information on between- and within-group analyses.

Table 3 (p. 69) summarizes the measurements according to category.

Relationships among dependent variables. In addition to considering differences between and within groups, this study allows the investigation of relationships between the dependent variables. Some of these relationships relate to methodological issues. These are relationships between measures within each category. For example, what is the reliability between the dominance measures employed in this study that have been used by different investigators and presumed to relate to the same underlying construct? Relationships between measures in different categories

Table 3

Arrangement of Scores in Categories

Score	Description
	Efficiency Scores
(i)[b]	Number of questions asked in individual session
(ii)[b]	Total questions asked of examiner by family (F)[a]
(iv)	Proportion of questions that were abstract in individual session
(v)	Proportion of questions that were abstract in family session
	Family Structure Scores
(ix)[d]	Questions suggested by individual but not chosen by family
(xii)	Questions initiated by individual and asked of examiner as a proportion of total number of questions initiated
(xiii)	Proportion of family's total questions asked of examiner that were initiated by this individual
(xv)	Spontaneous agreement of family members before discussion (F)[a]
(xvi)	Individual's choice fulfilment score
(xvii)	Family's mean choice fulfilment score (F)[a]
	Scores Indicating Impact of Family on Individual
(iii)[c]	Family's total questions compared to individual's total
(vi)[c]	Proportion of abstract questions in family session compared proportion in individual session
	Communication Patterns
(vii)	Frequency of amorphous behavior during family session
(viii)	Frequency of correction of another member's amorphous behavior
(xi)	Questions spontaneously asked by individual without discussion with other family members
(xiv)[e]	Composite Rorschach communciation clarity score (F)[a]

a: scores followed by (F) are family scores. All members of the same family receive an identical family score
b: relates inversely to efficiency
c: positive scores indicate improvement in family context
d: relates inversely to dominance
e: relates inversely to communication deviance

provide suggestions regarding the relationships between the underlying contructs in family interaction. In order to explore the above issues, a multiple regression analysis was conducted on the dependent individual measures, for all 114 subjects.

Results

Within- and between-group differences were determined by analyses of variance (ANOVA) and analyses of covariance (ANCOVA). Relationships between measures were determined by a correlation analysis. These will be described in separate sections below.

Within- and between-group differences

Statistical treatment. Four main effects were investigated in this aspect of the study. These are: effect of diagnostic group (A), effect of sex of identified patient (B), effect of number of biological parents in the household (C), and effect of generation in the family (D). The first three are between-group effects, and the final is a within-group effect. Differences on control variables across these effects determined whether ANOVA or ANCOVA were used to determine differences between groups. This is described in detail below.

a) ANOVA on control variables: First, ANOVA on the three control variables of SES, age, and estimated I.Q.

(from the scaled score of the WAIS) were performed. Significant differences across groups are presented in Table 4.

Table 4

Significant Difference Between Groups on Control Variables

Control Variable	Means of Groups	F[a]	p
SES[b]	Families of females: 7.3 Families of males: 4.2	23.33	.0001
Parent's Age	Single-Parents: 47 years Parents in Two-Parent Families: 57.3 years	17.22	.0003
total I.Q.[c]	Single Parent Families: 9.9 Two-Parent Families: 12.0	15.16	.0004
Parent's I.Q.[c]	Single-Parents: 10.9 Parent in Two-Parents Families: 11.8	5.22	.024
Patient's I.Q.[c]	Patients in Single-Parent Families: 9.6 Patients in Two-Parent Families: 12.4	9.56	.004

[a] degrees of freedom for all analyses reported: 1
[b] based on Adult Personal Data Inventory conversion (U.S.H.E.W., 1976)
[c] WAIS Vocabulary scaled score

It can be seen from this table that no significant differences were found between diagnostic groups on any of the control variables, and that offspring and parents did not differ significantly on I.Q. It was found that SES levels are significantly higher in families of female patients

compared to families of male patients. While no differences were found in the age of the patient across groups, the age of parents was significantly lower in single-parent families, compared to two-parent families. I.Q. scores were also found to be lower for family members overall in single-parent families compared to intact families. When patients and parents were compared separately across groups this difference still held. Means and standard deviations on control measures for all groups can be found in the appendix.

b) ANOVA on dependent measures: Between-group differences were investigated by three-way ANOVA performed on the 17 dependent measures. Between-group analyses were first conducted on data from all subjects together. Then parents alone, patients alone, and mother alone were compared across groups on all measures. In addition, four-way ANOVA were conducted on individual measures only (i.e. excluding measures ii, xiv, xv and xvii, using the three between-group variables and the fourth within-group variable of generation.

c) ANCOVA on dependent measures: As some groups differ systematically on control variables, significant differences from ANOVA between these groups may be attributable to differences along control variables. For this reason, whenever significant differences were found between groups that also differed on a control variable,

ANCOVA were performed. Thus ANCOVA were necessary under the three following situations. When differences were found between families of male and female patients, the data were reanalyzed with ANCOVA to remove the effect due to differences in SES. When differences were found between single-parent and two-parent families or between patients in these families, ANCOVA to remove the effect of I.Q. were performed. Finally, when differences between parents in single-parent and two-parent families were found, ANCOVA to remove the effects of age and I.Q. were performed.

Organization of results and tables. The description of the results is organized in the following format. The between-group analyses will be described first. These consist of: a) differences between families, where the pooled scores of all family members were analyzed, b) differences between patients, where the scores of the hosoitalized family member alone are compared between groups, c) differences between parents, where the scores received by the parents are compared between groups, and d) differences between mothers, where the analyses were conducted on mothers' scores alone. Following the four between-group analyses, the results from the within-group analyses will be described. In this set of analyses, e) differences between parents and offspring are compared on all individual measures across groups.

In each of the five sets of analyses described above, the report of the results will be organized in the categories of efficiency, family structure, impact and communication. This organization follows the presentation of the literature review, and the arrangement of dependent measures in the procedure (see Tables 2, p. 64 and 3, p. 69 for a description of individual measures).

The results are summarized in Tables 5-9. Each table represents one of the analyses a) to e) described in this section. While means and standard deviations for all groups on all dependent measures appear in the appendix, only the differences that attain at least the .10 level of significance are reported in this section.

The columns in Tables 5-9 separate scores in the categories of efficiency, family structure, impact of family and communication patterns, to parallel the description of the results. The rows separate the effects. The row indicated by (A) in each table reports on the main effect of diagnostic group; row (B) reports on differences due to the sex of the identified patient; row (C) reports differences between single-parent and two-parent family members; and row (D) reports differences between parents and offspring. Interactions are indicated by combinations of letters representing the main effects. Since only significant effects are listed, all the above rows will not appear on every table.

Differences between families. Table 5 (pp. 76, 77) presents means and probability levels for differences on dependent measures with the scores from all family members combined. Thus these differences suggest how all family members in particular kinds of families respond differently from all family members in other groups.

Efficiency: Differences on measures of efficiency between schizophrenic and control families are indicated in column I of Table 5. Members of families of schizophrenic patients are less efficient at problem solving tasks in individual sessions (i) than are members of families of control patients (row A). The cognitive strategies of members of families with a schizophrenic patient are less sophisticated in both individual (iv) and family (v) sessions, compared to members of families of control patients.

Members of families of female patients use more sophisticated cognitive strategies in individual sessions (iv) compared to members of families of male patients (row B).

Members of single-parent families use less sophisticated cognitive strategies than members of two-parent families in family sessions (v) (row C).

There is an interaction between diagnostic group and sex of patient (row AB) for performance in individual sessions (i). Individual members of families of male patients perform at a very similar level, regardless of

Table 5

Means and Levels of Significance for Differences

Between Groups

with Data From All Family Members Included

	I			II		III	IV		
Category:	Efficiency			Structure		Impact	Communication		
	EFFECT OF DIAGNOSTIC GROUPS (A)								
Score	(i)[d]	(iv)	(v)	(xvi)	(xvii)		(vii)	(xi)	(xiv)[d]
X A1 (Schizophrenic)	34.9	.39	.49	29.5	29.7		7.0	10.0	3.5
X A2 (Control)	28.8	.50	.64	32.4	32.2		3.8	6.6	5.4
p[a]	.04	.009	.003	.011	.076		.003	.02	.0002
	EFFECT OF SEX OF PATIENT (B)[b]								
Score		(iv)							
X B1 (Male)		.52							
X B2 (Female)		.61							
p[a]		.025							
	EFFECT OF NUMBER OF PARENTS (C)[c]								
Score			(v)	(xv)		(iii)[e]			
X C1 (Single-parent)			.51	19.7		-.41		11.2	
X C2 (Two parents)			.62	14.3		.21		5.5	
p[a]			.001	.0009		.07		.044	
	BC INTERACTION								
Score				(xvi)				(xi)	
X B1C1				26.9				14.2	
X B2C1				33.3				7.9	
X B1C2				31.8				6.4	
X B2C2				31.8				4.6	
p[a]				.006				.069	

Table 5 cont'd

Category:	I Efficiency	II Structure	III Impact		IV Communication	
AB INTERACTION						
Score	(i)[d]		(iii)[e]	(vi)[e]	(vii)	(vii)
X A1B1	31.3		-.38	.01	9.6	1.7
X A2B1	31.9		.13	.18	4.0	.6
X A1B2	38.5		.20	.17	4.3	1.0
X A2B2	25.7		-.13	.10	7.3	1.1
p[a]	.026		.03	.04	.04	.058
AC INTERACTION						
Score		(xv)			(xi)	
X A1C1		17.6			15.8	
X A2C1		21.7			6.5	
X A1C2		14.9			4.2	
X A2C2		13.6			6.8	
p[a]		.066			.012	

a: only p at or below .10 reported
b: effect of SES removed
c: effect of I.Q. removed
d: relates inversely to construct
e: positive scores indicate improvement in the family context

their diagnostic category. However in families of female patients, members of families with a schizophrenic patient perform less efficiently than do member of families of control patients.

Family structure: The measures that fall into this category of family interation appear in column II of Table 5. The individuals in families of schizophrenic patients have a smaller proportion of their individual choices reflected when the family is working together to make choices (xvi) (row A). When families are compared for mean choice fulfilment (xvii), the difference across diagnostic groups is not as great, but approaches significance.

There is an interaction between sex of patient and number of parents (row BC) for the choice fulfilment measure (xvi), with individuals in single-parent families of male patients having lower choice fulfilment than individuals in single-parent families of female patients. In two-parent families, the choice fulfilment scores are not different according to sex of the identified patient, and take a value midway between those of single-parent families.

There is less spontaneous agreement in single-parent families compared to two-parent families (xv) (row C).

An interaction approaching significance between diagnostic group and number of parents (row AC) shows that in two-parent families of both control and schizophrenic

patients, spontaneous agreement is lowest. This is followed by agreement in single-parent families of schizophrenics, with control single-parent families having the highest agreement.

Impact of family: These measures appear in column III of Table 5. Members of single-parent families become less efficient in family sessions compared to individual sessions, while members of intact families improve (iii) (row C). This difference approaches significance.

There is an interaction between diagnostic group and sex of patient on this measure (iii) (row AB), with families of male schizophrenics and female controls becoming less efficient in family sessions, while families of male controls and female schizophrenics improve, with the latter families showing the most improvement from individual to family sessions. A similar interaction exists for change in cognitive strategy sophistication from individual to family session (vi). Families of schizophrenic males and control females show little improvement, while families of female schizophrenics and male controls show more.

Communication patterns: Differences on these measures appear in column IV, Table 5. All members of families of schizophrenics show more amorphousness (vii) and premature closure (xi) (row A). Their composite communication clarity and development score on the Rorschach (xiv) is

significantly lower. Members of single-parent families close prematurely (xi) more frequently than members of intact families (row C).

There are several interaction effects among communication pattern variables. On amorphousness (vii) families of male schizophrenics and female controls show the highest frequencies, while families of female schizophrenics and male controls have a much lower frequency. On corrections of amorphousness (viii) by other family members this pattern is also approximated and the results approach significance. Corrections occur with greatest frequency in families of male schizophrenics and female controls, closely followed by families of female schizophrenics, while families of male controls have the lowest frequency. On the dimension of premature closure (xi) an interaction exists between diagnostic group and number of parents (row AC). The greatest frequency of this behavior is in single-parent families of schizophrenic patients, and the least is in two-parent families of control patients. There is also an interaction effect for sex of patient and number of parents (row BC) with the greatest frequency of premature closure in single-parent families of male patients, and the least in intact families of male patients.

Differences between patients. Table 6 (p. 81) presents the significant differences and means on the dependent

Table 6

Means and Levels of Significance for Differences

Between Patients

Category:	I Efficiency		II Structure	III Impact	IV Communication
EFFECT OF DIAGNOSTIC GROUP (A)					
Score	(i)[c]	(iv)	(xvi)		
X A1 (Schizophrenic)	34.7	.41	28.4		
X A2 (Control)	23.9	.57	31.9		
p[a]	.016	.014	.055		
EFFECT OF NUMBER OF PARENTS (C)[b]					
Score			(xiii)		(xi)
X C1 (Single-parents)			.6		15.1
X C2 (Two parents)			.4		5.0
p[a]			.083		.084
AC INTERACTION					
Score					(xi)
X A1C1					19.6
X A2C1					10.6
X A1C2					3.2
X A2C2					6.8
p[a]					.035

a: only p at or below .10 reported
b: effect of I.Q. removed
c: relates inversely to construct

variables across groups for the identified patients in each family.

Efficiency: Patients with a diagnosis of schizophrenia are less efficient at problem solving tasks when working on their own (i), than are patients with other psychiatric diagnoses. Their cognitive strategies are less efficient when they are working on their own (iv) than are those of control patients.

Family structure: Patients with a schizophrenic diagnosis have less choice fulfilment in the family context (xvi).

Patients in single-parent families contribute proportionately more questions in the family problem solving situation (xiii) than patients from intact families. These results approach but do not reach significance.

Impact of family: No difference between groups of patients exist in this category.

Communication patterns: Patients from single-parent families close the discussion prematurely (xi) more frequently than patients from two-parent families.

There is an interaction between diagnosis and number of parents on this measure. Schizophrenic patients from single-parent families close prematurely most frequently, and more than control patients from single-parent families. Premature closure is less frequent in patients from intact families, and control patients from such families have

higher premature closure scores than schizophrenic patients.

Differences between parents. The results of this set of comparison are presented in Table 7 (pp. 84, 85).

Efficiency: No differences between parents of schizophrenics and parents of controls exist as a main effect on any measures in this category. There is an interaction effect on performance during individual sessions (i) for diagnostic group and sex of identified patient. Parents of schizophrenic males perform better than parents of schizophrenic females in individual sessions. In control families however, parents of females perform better than parents of males on the same measure.

Family structure: The dependent varable in this category on which most differences exist is choice fulfilment (xvi). Parents of schizophrenics and males have less choice fulfilment in the family situation than do parents of controls and females, respectively. There is an interaction for choice fulfilment (xvi) between sex and number of parents, with single parents of males having less choice fulfilment than couples who are parents of male patients, while single parents of females have more choice fulfilment that couples who are parents of female patients. There is also an interaction between diagnosis and number of parents, with single parents of schizophrenics having less choice fulfilment than parents of intact families of schizophrenic

Table 7

Means and Levels of Significance for Differences

Between Parents

Category:	I Efficiency	II Structure	III Impact	IV Communication		
EFFECT OF DIAGNOSTIC GROUP (A)						
Score		(xvi)		(vii)	(viii)	(xi)
X A1 (Schizophrenic)		31.6		6.4	1.6	6.6
X A2 (Control)		33.1		3.7	.7	5.0
p[a]		.057		.019	.072	.028
EFFECT OF SEX OF PATIENT (B)[b]						
Score		(xvi)				
X B1 (Male)		31.6				
X B2 (Female)		33.0				
p[a]		.052				
BC INTERACTION						
Score		(xvi)				
X B1C1		29.2				
X B2C1		35.6				
X B1C2		32.7				
X B2C2		31.6				
p[a]		.004				
AC INTERACTION						
Score		(xvi)	(iii)[c]			
X A1C1		30.1	.09			
X A2C1		34.5	-.05			
X A1C2		32.3	-.02			
X A2C2		31.9	.07			
p[a]		.035	.069			

Table 7 cont'd

Category:	I Efficiency	II Structure	III Impact	IV Communication
		AB INTERACTION		
Score	(i)[d]		(iii)[e]	(viii)
X A1B1	30.9		-.09	2.2
X A2B1	35.8		.23	.6
X A1B2	37.0		.07	1.0
X A2B2	27.3		.03	.8
p[a]	.032		.038	.065
		ABC INTERACTION		
Score		(xii)		
p[a]		.005		

a: only p at or below .10 reported
b: effect of SES removed
c: positive score indicates improvement in the family context
d: relates inversely to construct

patients, while single parents in control families have more choice fulfilment than parents in intact families of control patients.

There is a significant three-way interaction on dominance measure xii.

Impact of family: There are two significant interactions involving the impact of the family on the individual as measured by the difference between family and individual functioning (iii). Diagnostic group interacts with number of parents: single parents of schizophrenics improve slightly in the family context compared to the individual session, while parents of intact families of schizophrenics function better individually; the difference between groups is greater, and in the opposite direction with control families, where single parents perform better individually than in the family, and intact family parents do not perform as well individually as in the family context. Sex of patient interacts with diagnostic group, with parents of schizophrenic males showing a deterioration when working with the family, while the family context improves the performance of all the other three groups, with the most improvement shown by parents of control males.

Communication patterns: Parents of schizophrenics show significantly more amorphous behavior than parents of controls viii, and close prematurely significantly more

frequently (xi). Parents of schizophrenics correct amorphous behavior in other members of the family more frequently (vii), at a level approaching significance.

There is an interaction that approaches significance between diagnosis of identified patient and sex of identified patient. Correction takes place most frequently by parents of male schizophrenics, followed by parents of female schizophrenics. In control families, parents of females correct more than parents of males.

Differences between mothers. The results of this group of analyses are present in Table 8 (p. 88).

Efficiency: An interaction approaching significance exists between diagnostic group and number of parents on the measure of sophistication of cognitive strategy in the individual session (iv). In one-parent families, mothers of schizophrenics use less sophisticated cognitive strategies than mothers of controls, but in intact families, the level of sophistication is closer together in mothers of schizophrenics than controls, with the former being more sophisticated.

Family structure: No differences between mothers relative to diagnostic group was found.

In single-parent families, mothers make more contribution to the family decision-making process (xii).

Table 8

Means and Levels of Significance for Differences Between Mothers

Category:	I Efficiency	II Structure	III Impact	IV Communication	
EFFECT OF DIAGNOSTIC GROUP (A)					
Score			(vi)[c]	(vii)	(xi)
X A1 (Schizophrenic)			.08	6.3	8.2
X A2 (Control)			.20	3.6	4.8
p[a]			.015	.022	.083
EFFECT OF NUMBER OF PARENTS (C)[b]					
Score		(xii)			
X C1 (Single-parent)		.9			
X C2 (Two parents)		.7			
p[a]		.024			
BC INTERACTION					
Score		(xvi)			
X B1C1		28.5			
X B2C1		35.5			
X B1C2		31.4			
X B2C2		31.7			
p[a]		.054			
AC INTERACTION					
Score	(iv)	(xvi)			
X A1C1	.30	29.9			
X A2C1	.43	34.1			
X A1C2	.48	32.4			
X A2C2	.38	30.6			
p[a]	.086	.057			

a: only p at or below .10 reported
b: effect of age and I.Q. removed
c: positive score indicates improvement in the family context

An interaction was found between sex of identified patient and number of parents on the choice fulfilment measure (xvi). In single-parent families, mothers of males have less influence on family choice than mothers of females. In two-parent families, mothers of males and females have approximately the same degree of influence on family choice.

There is also an interaction between diagnostic group and number of parents. In families of schizophrenics, single-parent mothers have less influence than two-parent mothers on family choice. In families of controls, single-parent mothers have more influence on family choice than two-parent mothers.

Impact of family: Mothers of schizophrenics improve less from the individual to the group session (vi) in their cognitive strategies than do mothers of control patients.

Communication patterns: Mothers of schizophrenics show more amorphousness (vii) that do mothers of controls. Their tendency to close prematurely more frequently (xi) than mothers of controls approaches significance.

Within group analyses. Differences between parents and offspring within groups are presented in Table 9 (p. 90).

Efficiency: There is an interaction between diagnostic group and generation. Parents of schizophrenics perform more efficiently than their offspring in individual sessions (i); parents of controls perform less efficiently than their off-

Table 9

Means and Levels of Significance for Differences Between Parents and Offspring

Category:	I Efficiency	II Structure	III Impact		IV Communication
EFFECT OF GENERATION (D)					
Score		(xiii)	(xvi)	(iii)[c]	(vi)[c]	(xi)
X D1 (Parent)		.31	32.6	.06	.16	5.8
X D2 (Offspring)		.37	29.9	-.13	.06	9.4
p[a]		.017	.018	.036	.021	.027
AD INTERACTION						
Score	(i)[b]	(xiii)			(vi)	
X A1D1	27.3	.34			.12	
X A2D1	32.1	.28			.21	
X A1D2	34.7	.33			.10	
X A2D2	23.9	.41			.02	
p[a]	.006	.003			.033	
CD INTERACTION						
Score					(vi)[c]	
X C1D1					.11	
X C2D1					.20	
X C1D2					.10	
X C2D2					.02	
p					.052	
ACD INTERACTION						
Score				(iii)[c]		
p[a]				.017		

a: only p at or below .10 reported
b: relates inversely to concept
c: positive score indicates improvement in the family context

spring, with the latter group having the highest individual efficiency.

Family structure: On the choice fulfilment measure (xvi), parents have a greater ability to influence the family choice than do offspring. Parents contribute less to the decision-making process, on the whole, than do offspring (xiii). An interaction between diagnostic group and generation shows that this is true in the control group, and not in the schizophrenic family group, where offspring contribute less than their parents.

Impact of family: Family functioning is better than the functioning of parents alone (iii). However offspring perform better individually than they do with their parents. Similarly, parents improve in cognitive functioning from individual to family sessions more than offspring do.

Interactions on this measure exist between diagnostic group and generation, and number of parents in family and generation. In families of schizophrenic patients, the difference in improvement between parent and offspring is less than in families of control patients. In single parent families, the difference in improvement between parent and offspring is less than in intact families.

Communication Patterns: Offspring close prematurely (xi) more frequently than do parents.

Relationship between dependent measures

Correlations were obtained for the 11 dependent individual measures for all 114 subjects. Measure x was excluded, as it has significance as a ratio rather than a score and is represented as such in measures xii and xiii. The results are presented in Table 10 (p. 93). Correlations significant at at least .05 are indicated by an asterik. The outlined areas contain the within-category correlations. These will be described for each category below, before the between-category correlations are described. Only the correlations at or approaching the .05 level are considered below.

Efficiency. In the category of efficiency, there is a negative correlation approaching significance (-.19) between the number of questions asked by the family member during the individual session (i), and the level of cognitive sophistication of the individual during the individual testing (iv). Cognitive sophistication levels are highly correlated (.99) across individual (iv) and family sessions (v).

Family structure. Significant negative correlations were found between the number of questions initated by a family member but not chosen by the family (ix) and the dominance ratio (xii) (-.43), and (xii) and the choice fulfilment score (xvi) (-.20).

Impact of family. There is a strong correlation (.72)

Table 10

Relationship Between Dependent Measures

		Efficiency (E)			Structure (S)				Impact (I)		Communication (C)		
		(i)	(iv)	(v)	(ix)	(xii)	(xiii)	(xvi)	(iii)	(vi)	(vii)	(viii)	(xi)
	(i)		-.19	-.15	-.04	.03	-.20*	-.07	.02	-.17	.03	-.12	.13
	(iv)	-.19		.99*	.04	.77*	.07	-.23*	.95*	.72*	.17	.69*	-.09
(E)	(v)	-.15	.99*		.04	.76*	.05	-.23*	.97*	.70*	.15	.69*	-.12
	(ix)	-.04	.04	.04		-.43*	.08	.11	.03	-.03	.00	.02	-.30*
	(xii)	.03	.77*	.76*	-.43*		-.11	-.20*	.73*	.43*	.18	.47*	.22*
(S)	(xiii)	-.20*	.07	.05	-.08	-.11		-.06	.10	.75*	-.09	.33*	.00
	(xvi)	-.07	-.23*	-.23*	.11	-.20*	-.06		-.24*	-.22*	-.14	-.16	-.17
	(iii)	.02	.95*	.97*	.03	.73*	.10	-.24*		.72*	.13	.68*	-.15
(I)	(vi)	-.17	.72*	.70*	-.03	.43*	.75*	-.22*	.72*		.04	.68*	.08
	(vii)	.03	.17	.15	.00	.18	-.09	-.14	.13	.04		.11	.30*
(C)	(viii)	-.12	.69*	.69*	.02	.47*	.33*	-.16	.68*	.68*	.11		-.07

* indicates significance at .05 level

between impact of family on efficiency (iii) and on cognitive strategy (vi).

Communication patterns. There is a significant correlation (.30) between frequency of amorphous behavior (vii) and tendency towards premature closure (xi).

Other significant correlations. There are several sets of significant correlations between measures in the category of efficiency and those indicative of family structure. Individual efficiency (i) correlates (-.20) with dominance ratio (xiii). Level of cognitive sophistication in the individual sessions (iv) correlates with a dominance ratio (xii) (.77), and negatively with choice fulfilment (xvi) (-.23). Proportion of abstract questions in family sessions (v) correlates with a dominance ratio (xii), and also negatively with choice fulfilment (xvi) (-.23).

Several measures of efficiency correlate with impact of family on individual members. Degree of abstraction in individual sessions (iv) correlates (.72) with change in abstraction from individual to family sessions (vi). There is also a significant correlation (.70) between abstraction in family session (v) and change in abstraction (vi). There are corresponding correlations between change in efficiency from individual to family sessions (iii) and abstraction in individual (iv) (.95) and family sessions (v) (.97).

There are some significant correlations between family

structure variables and measures of impact of family on the individual. Change in efficiency from individual to family sessions (iii) correlates with a dominance ratio (xii) (.73), and negatively with choice fulfilment (xvi) (-.24). Correlations between measures of family structure and communication patterns wre found where the questions rejected by the family (ix) correlated with tendency to premature closure (xi) (.30). Correction of another member's amorphousness (viii) correlates significantly with the dominance indicators (xii) and (xiii) (.47 and .33). Finally, measures of the impact of the family on the individual correlate with communication patterns. Both change in efficiency from individual to family sessions (iii) and change in abstraction (vi) correlate with correction of other member's amorphousness (viii) (at .68 and .72 respectively).

Discussion

In this section, the major results will be highlighted, and a discussion will ensue. This section is organized in the following format:

The subject pool will first be considered.

This will be followed by a discussion of the family interaction data. The main between- and within-group effects will be examined. This will involve a discussion of the differences between: 1) families of schizophrenic patients

vs. families of psychiatric controls; 2) families of male patients vs. those of female patients; and 3) single-parent families of psychiatric patients vs. intact families of such patients. Differences between parents and offspring will be discussed within each of these subsections.

Selected interaction effects will be considered next. The important interactions to be discussed are: 1) diagnosis with sex of patient; 2) diagnosis with number of parents; 3) number of parents with sex of patient. After this general discussion, the family constellation that appears most disabled: the single-parent family of the schizophrenic male, will be described.

An integrative summary of the substantive data will follow.

Finally, the relationships between dependent variables will be discussed. At the beginning of this section, the methodological issues posed by the relationships of measures within categories will be considered. This will be followed by a discussion of the between-category relationships.

The subject pool

As in all experiments which depend on volunteers and require informed consent before data are collected, it is possible that there is an interaction between refusal to participate and family characteristics. It is likely that

our sample does not include parents and patients with schizoid and/or paranoid features, as such individuals are less likely to agree to be subjects in a study. In addition, refusal to be involved in a family study would be more likely in highly conflicted families, where members may not anticipate a positive experience in performing joint tasks. It is not clear how or whether a lack of such families affects our data. Of the subjects that did participate, the demographic data suggest that the pool includes a wide range of families.

A comparison of families of schizophrenics vs. families of psychiatric controls.

Efficiency. When all family members are considered together, members of families of schizophrenic patients are less efficient in individual sessions (i) than members of families of psychiatric controls. When the patient and his or her parents are considered separately, this difference from the control group is restricted to patients. The interaction between diagnostic group and generation indicates that of the four combinations of parents and offspring in each diagnostic group, schizophrenic offspring are the least efficient, control offspring the most efficient, and parents of schizophrenics are more efficient in individual sessions than parents of controls.

Proportion of abstract questions, an indicator of level

of cognitive sophistication, is smaller for members of families of schizophrenics than for families of nonschizophrenics. This is the case in both individual (iv) and family (vii) sessions. Again, when parents and offspring are considered separately, the schizophrenic patients show less cognitive sophistication in individual sessions (iv), but there are no significant differences among the parents.

Family structure. Schizophrenic patients and their parents have fewer of their choices represented in their family's choices. There is a significant AD interaction for measure (xiii), indicating that while schizophrenic offspring contribute fewer questions to the family's 20 Questions task than their parents do, control offspring contribute a greater proportion than their parents.

Impact of family. An indication of the differential impact of family members on cognitive strategy is that there is an AD interaction on measure vi. The proportion of abstract questions improves less from individual to family sessions for schizophrenic offspring than for their parents. In control families, the direction of the difference in improvement between parents and offspring is the same, but the extent of the difference is greater.

Communication patterns. There is more amorphousness (vii) in families of schizophrenics compared to families of controls. When parents and offspring are considered separ-

ately, this difference holds for parents but not for offspring. There is more premature closure (xi) in families of schizophrenics, and again, the difference holds between parents in the separate diagnostic groups, but not between patients. There is a highly significant difference on Rorschach measures (xiv) between families of schizophrenics and controls with the former showing greater communication deviance.

It is the patient diagnosed schizophrenic in the family who is the least efficient member, both in terms of individual performance (i.e. measure i), and in level of abstraction. Parents of schizophrenics perform a little better than parents of controls. However, when the family functions together, there are no significant differences in efficiency. Several experimenters in the past (Reiss, 1967, 1968, 1969, Mishler and Waxler, 1968) found that families of schizophrenics are less effective at problem solving when functioning together as a group. Wild and Shapiro (1977), found that there are no differences in efficiency between two-parent families of male schizophrenics and controls. This study corroborates and extends some of Wild and Shapiro's results. No differences in group functioning were found.

Another finding of Wild and Shapiro that was corroborated by this study is that parents are more dominant compared to their offspring in the decision-making process in

families of schizophrenics than they are in families of controls. Schizophrenic patients contribute less to the family's questions than parents do. This does not appear to be because their contributions are rejected more frequently by the parents (i.e. on measures ix and xii there are no differences between the schizophrenic patient and his or her parents), and so is probably due to different levels of activity, or generation of questions, during the family sessions.

Overall, the choice fulfilment for individual members in families of schizophrenic patients is lower than that in control families. When patients and parents are considered in separate groups, this is found to distinguish between diagnostic groups on both generational levels. As there is no difference in the level of agreement existing spontaneously prior to discussion in schizophrenic vs. control families, this suggests that somehow, in the decision-making process, some choices were made as family choices that did not correspond to the individual choices of any family member!

In families of schizophrenics there appears to be a parallel between the dominance ratio II (i.e. proportion of questions contributed to the family's total by the individual member), and the choice fulfilment score. Schizophrenic patients are lower on both measures compared to their parents. Control patients, on the other hand, contri-

bute more than their parents to the family's questions, although they also have lower choice fulfilment scores than their parents. A possible explanation for these differences between schizophrenic and control patients would support Wild, Shapiro and Goldenberg's (1977) hypothesis about differential power distribution in the families of schizophrenics vs. controls. They postulated that power is rigidly distributed in families of schizophrenics, and dominance is determined solely by role. In families of controls, on the other hand, they suggested that dominance has a flexible distribution, with the most effective being the most dominant. Both the choice fulfilment score, and the ratio of contribution to the family's questions, are indicators of dominance. In both cases, the schizophrenic patient was less dominant than the parent(s), suggesting the rigid hierarchical allocation of power postulated by Wild, et al. In control families, the patient contributed more to the 20 Questions task than their parents did, but had lower choice fulfilment, suggesting a more flexible distribution of power.

However, an important aspect of Wild, et al.'s description of the families of schizophrenics is that the offspring's competence which is greater than the parents' competence, is not allowed to emerge in the family context. In this study, the offspring with a schizophrenic diagnosis

was not as competent outside the family as the parent. The lower dominance ratio could reflect lower competence outside the family. In other words, in this study, dominance was distributed by role, and accorded to the most competent members of the families, which in schizophrenic families, were the parents.

There are several possible reasons for this discrepancy between the two studies. In their study, neither female patients and their parents, nor single-parent families were included in the subject pool. Thus the addition of these groups may account for the difference in results. However, when the males and females in our study are considered separately, this pattern still holds. On measure (i) which relates inversely to efficiency, male controls are more efficient (mean = 25.3) than male schizophrenics (mean = 31.5), and female controls are more efficient (mean = 23.3) than female schizophrenics (mean = 38). When single and two-parent families are considered separately, in single-parent families schizophrenic patients perform less efficiently (mean = 34.5) than control patients (mean = 25.2). In two-parent families, schizophrenic patients perform less efficiently (mean = 34.9) than controls (mean = 22.8). When these groups are further broken down to isolate the group that is most directly comparable to Wild's groups, the male patients in the two-parent family, this pattern does not

change. Schizophrenic males in two-parent families perform less efficiently (mean = 31.3) than patients in the two-parent control group (mean = 23).

The other possible reason for the discrepancy is that the diagnostic criteria for schizophrenia in the two studies are different. It is not clear what the diagnostic criteria for Wild and Shapiro's schizophrenics were. The RDC used in this study may be more stringent, and selecting those patients on the process end of the schizophrenic continuum may have resulted in a group clinically different from Wild and Shapiro's.

Some of Wild and Shapiro's findings on the impact of the family on the individual were not replicated by this study. They found that the schizophrenic patient functions better outside the family than inside it, whereas we found that family function is better than individual function of schizophrenic patients. Here the discrepancy in results can be partially accounted for by the addition of female patients to the groups. While female offspring who are schizophrenic have a lower individual performance than family performance (mean change score = .07), male schizophrenic offspring perform better individually (mean change score = -.20) than the family does. Cognitive sophistication decreases for male schizophrenics (mean change score = -.002), but increases for female schizophrenics (mean change score = .18)

from the individual to the family session. However in single-parent families, as in two-parent families, there is an overall loss of efficiency for both schizophrenic and control patients. When the group most directly comparable to Wild and Shapiros' are considered, both schizophrenic and control male patients have higher individual efficiency than family efficiency, and the control patients have a higher change score (mean = -.08) than schizophrenic patients (mean = -.06). Thus this comparison indicates that while the male schizophrenic patients in our group suffer the same deterioration in the family context as Wild and Shapiro's schizophrenic patients do, our control patients also respond to the family situation the same way. The possibility that the differences may be due to diagnostic discrepancies has been suggested above.

There are differences between families of schizophrenics and controls in terms of the way the behavior of individual members is affected by the family context. Parents of schizophrenics were a little better (though not significantly so) than parents of controls at individual performance of the 20 Questions task. The AD interaction on this measure indicates that parents of schizophrenics, and control patients, were more effective individually than the other two groups, i.e. schizophrenic patients and parents of controls. When placed in the family context where schizo-

phrenic patients with less individual efficiency also contribute to function, the system maintains its efficiency by an improvement in the parent's cognitive strategy. The AD interaction for improvement in cognitive functioning from individual to family session (vi), shows that the family affects the parent of the schizophrenic more positively than it affects the schizophrenic offspring. However, in control families, the system maintains efficiency because the parents, who are less efficient outside the family situation than their offspring, improve in their cognitive strategy in the family context.

These differences suggest distinctions between families of schizophrenics and families of controls with implications along the dimensions of individuation. In control families, there is interaction with the family system that allows the less efficient members to improve and increase functioning in the family context. Control offspring tend to function well in relation to their parents both inside and outside the family context. In such families, the system can be seen as having a beneficial effect on all members, and still keeping a high level of functioning as a family. In families of schizophrenics, the least efficient members outside the family context remain the least efficient members inside the family context. The system compensates for them, and the more individually efficient members pick up the level of

family functioning. While the family context in such families may have a beneficial effect on parents, members who already function well outside the system, it does not have this effect on members functioning poorly outside the family. As the level of functioning of schizophrenic offspring is maintained at a low level, this family system discourages the development of individual competence which would be the preliminary to individuation and separation.

These observations fit in with Haley's (1980) concepts of behavior in families of "mad" young adults. He suggests that the offspring sacrifices him or herself as a way of protecting the system that is threatened by the competence and imminent separation from the family of one of its members. In the schizophrenic families in this study, the offspring is ineffective, and the system accomodates to maintain that ineffectiveness by increasing the parents' competence.

The communication deviance in families of schizophrenics is greater than in families of controls, and this is largely due to differences between parents. Parents of schizophrenics show more amorphous behavior, and close prematurely more frequently than parents of controls.

What role would communication deviance play in the families of schizophrenics? Haley (1980) has suggested that deviant communication between family members serves to

"stabilize" the organization. It distracts from the conflicts in the family by focusing attention on one of the members around which the family can organize, thereby maintaining unity. It is interesting that while Haley was considering deviant behavior and communication in patients, in this sample of families, communication deviance as measured by amorphousness is typical of parents, and not of the patient in schizophrenic families. These findings may be a variant on Haley's constructs, as parents can provide an organizing locus just as offspring can. Haley refers to the "cycle" (1980, p.33) in severely disturbed families, where the organization moves from stabilization to unstabilization and back. Upon imminent separation of the offspring, the family becomes unstable. The parental power structure begins to become ineffective as conflict between the parents increases because their intermediary, the offspring, is moving out of that role. As the intactness of the family is threatened, the offspring begins to act "mad". This leads to a break, and the parents and family unify and focus attention on the offspring. The behavior improves as the family's instability is reduced. The family becomes stable and everything proceeds until the offspring begins to show competence; the parents are faced with the prospect of an unwelcome change in their relationship and thus the prospect of separation, and the cycle repeats itself. The families

in the study reported here participate at a stable point in their cycles. The offspring has had a break, been hospitalized and is on his or her way home to the bonded family unit. The offspring no long needs to act deviantly. The parents' relatively minor deviances may serve simply to cement more tightly the family with a future possibility of dissolution.

Our results corroborate the findings of Singer and Wynne (1963, 1965), and Wild and Shapiro (1977), and extend them to families of female patients and single parent families. Wild, et al. (1977) found that mothers of schizophrenic patients have higher amorphousness scores than mothers of controls. These findings were corroborated in this study. They also found that fathers of schizophrenics close prematurely more frequently than fathers of controls. ANOVA on closure scores of fathers in two parent families did not reveal such a difference in this study. In addition, Wild, et al. found that mother's amorphousness scores distinguished well between families of schizophrenics and families of controls. Neither of these differences was found in this study. However as the analyses had to be limited to the 22 fathers in the study, the small number may be responsible for the negative finding.

The data from this study indicate that parents of schizophrenics have more attention and communication deviance in

the family context than do parents of controls. This does not interfere with their efficiency. Indeed, among families of schizophrenics, in spite of high amorphousness and premature closure, functioning is as effective in the group problem solving situation as it is in families of controls. The pattern of frequent premature closure is consistent with the form of functioning in the family context described earlier for families of schizophrenics: family functioning is effective because of parents' effectiveness rather than the offspring's contributions. Premature closure limits input from other family members, reducing the possibility of contribution from the offspring.

A comparison of families of male and female psychiatric patients

As families of female patients had higher SES levels than families of males this effect had to be adjusted for. Only those effects that survived the adjustment are reported.

Efficiency. While no differences exist in overall efficiency as measured by number of questions to solve the individual and family sessions of the 20 Questions task between families of male and female patients, the latter have a significantly higher proportion of abstract questions in the family session (v).

Family structure. Parents of female patients have more choice fulfilment (xvi) than parents of male patients.

Impact of family and communication patterns. There are no indications of a main effect of sex of patient on the measures in these categories.

In families of female patients compared to families of male patients, parents have higher level cognitive strategies, and their choices are reflected better in the family situation. Surprisingly few differences were found between families of male and female patients. A lack of differences suggests that social and cultural factors which are expected to affect males and females differently, play a minimal role in family interaction patterns.

However, it is important to note that the absence of a main effect does not indicate that families respond and interact identically with male and female patients in all circumstances. Our measures may be too gross to detect differences in interaction. In addition, even with the measures taken in this study, some differences may be blurred in a main effect. For example, if single mothers interact differently with their sons than with their daughters, this would appear as a BC interaction, rather than a main effect.

A comparison of single- and two-parent families

Members of single-parent families in this study had lower I.Q. scores than members of two-parent families. The effect of I.Q. was removed whenever differences between these two groups were found. In addition, as parents' age

was lower in single-parent compared to two-parent families, this effect was adjusted for whenever differences were found between parents. Only those differences that remained significant after adjustment are reported.

Efficiency. Overall for all members, there are a smaller proportion of abstract questions in family sessions (v) compared to members of intact families.

Family structure. Offspring and mothers contribute a larger proportion of the questions in single-parent families (xiii), and there is more spontaneous agreement in single-parent families (xv). Mothers in single-parent families have a greater proportion of their contributions accepted in the family (xii) than do mother in intact families.

Impact of family. Overall there is a decrease in efficiency (iii) from the individual to the family context for members of single-parent families, while there is an increase in efficiency for two-parent family members. In cognitive strategy however, there is an overall improvement, and there is a significant CD (number of parents with generation) interaction. Parents of intact families improve in cognitive strategy the most in the move from individual to family context, and offspring in these families improve the least. Parents and offspring in single-parent families improve to similar degrees, with parents improving a little more.

Communciation patterns. Premature closure (xi) is present in higher frequency overall in single parent families compared to two-parent families. When patients and parents are separately compared across groups, this is found to be true of patients, but not significantly for mothers or parents as a group.

An issue that is immediately raised with these data is the comparability of two person group and three person group function. The differences between single-parent and intact families may be an artifact of the number of people involved in the tasks. In order to demonstrate that the results are not confounded by this factor, another experiment that takes pairs of intact family members and demonstrates differences in functioning would be necessary.

There are clearly some measures that can not avoid this artifactual effect. Measures xiii and xvi are most clearly problematic. For example, spontaneous agreement, measuring family agreement before discussion, would be expected to be higher in one-parent rather than two parent families. On a purely random basis, two individuals will be found to agree more frequently than three.

Aside from these measures, there are indications that other differences are not purely artifactual. There are considerable overlaps between groups for a number of these measures. Differences in proportion of abstract questions

measures. Differences in proportion of abstract questions in the family context (v) occur between subgroups of members of two-parent families as well, with some single-parent family members having higher scores as a group (e.g. single-parent families of female controls patients have higher mean scores than intact families of male controls).

Single-parent family are less efficient in the group problem solving situation. There are some clues as to what the negative effects in group functioning are. The proportion of questions asked that are constraints is lower, and fewer suggested questions are rejected by the family, suggesting that there is a lack of selectivity in the group decision making process. Patients spontaneously ask the examiner questions without consulting their parents an average of three times more frequently than they do in intact families. In addition to indication of difficulty with achieving closure, this behavior breaks a rule of the interaction: all questions must be discussed with other family members and agreed upon before being submitted to the examiner. There are no differences for patients from single- and two-parent families on measure (xii), a measure of accepted contribution, so it is not due to an attempt to override exclusionary restrictions from the parent. It seems the parent can not or will not stop the rule breaking of the offspring.

Clearly some normative data are necessary before it can be suggested whether this is a maladaptive pattern in single-parent families of psychiatric patients, and/or whether single-parent families function in totally different ways adapted to their structure, and these sets of behavior are adaptive. In this sample, rule breaking by the offspring occurs frequently, and limit setting can be inferred to occur infrequently. The change scores indicate that for this sample, these patterns of interaction are inefficient at the family level: individual members perform better separately than the family as a unit, in single parent families.

Interaction of diagnosis with sex.

The four groups from this interaction show interesting differences in family function. Each group will first be described below, and the differences discussed following the descriptions. Means for the different subgroups referred to below are presented in Table 11 (p. 115).

The family of the male schizophrenic patient. Individual functioning is average compared to the other groups for families of male schizophrenic patients. Family performance is the worst of all subgroups. All family members function more effectively outside the family than inside the family. Offspring deteriorate more than parents in the family context. Male schizophrenic patients are the only subgroup

Table 11

Means of Family Interaction Variables for the Interaction of Diagnosis with Sex of Patient

	M[a]	F[b]
Schizophrenic	31.9	37.0
Control	36.9	27.3

Parent's Individual Performance

	M	F
Schizophrenic	31.5	38.0
Control	25.3	23.3

Offspring's Individual Performance

	M	F
Schizophrenic	35.2	26.0
Control	28.0	28.3

Family Performance

	M	F
Schizophrenic	-.08	.07
Control	.23	.03

Parent's Change in Efficiency

	M	F
Schizophrenic	-.20	.07
Control	-.15	-.23

Offspring's Change in Efficiency

	M	F
Schizophrenic	.13	.12
Control	.26	.16

Parent's Change in Constraints

	M	F
Schizophrenic	-.00	.18
Control	.05	.03

Offspring's Change in Constraints

a: family members of male patient
b: family members of female patient

that show a mean decrease in cognitive sophistication from the individual to the family context.

The family of the male control patient. Individual performance of family members, and family performance is average compared to the other subgroups. All members show an improvement in cognitive sophistication in the family context. Parents improve in efficiency in the family, but patients' performance on the individual level is a little better than family performance.

The family of the female schizophrenic patient. Individual functioning for family members is least efficient of all groups. However, family performance, is the best of all groups. In other words, family members show the most overall improvement from individual to family session, of all subgroups, both in efficiency and in proportion of constraints.

The family of the female control patient. Families of female control patients have the best individual performance. Family performance, however, is average compared to the other groups. Both parents and offspring improve in the proportion of contraints in family compared to individual sessions. However, while parents' individual performance is not as good as family performance, patients perform better individually than they do in the family context.

These four systems show degrees of efficiency and bene-

fit for individuals in the family along a continuum. On one extreme is the family of the male schizophrenic. While individual function of the separate members is not significantly different from that of the other groups, family function is considerably worse. The family context has a debilitating effect on all family members, particularly the offspring. In short, the system is inefficient and benefits none of the individual members. Families of female controls are somewhat similar to families of male schizophrenics. Both patients and parents have high individual functioning. The difference between this group and families of male schizophrenics is that the family context does have a beneficial effect on some members: the parents improve when the family works together as a group. However the offspring performs better individually. Families of male controls show a more benign pattern with a similar theme. Families of male controls function well inside and outside the family context. While cognitive sophistication increases in the family context for all members, efficiency is improved only for the parents. As in families of female controls, the patient performs better individually. However family performance is high, and the degree of improvement experienced is greater than that for female control family members. On the far extreme, showing a picture that is, in a sense, "opposite" to that of the family of the male schizophrenic, is the

fit for individuals in the family along a continuum. On one extreme is the family of the male schizophrenic. While individual function of the separate members is not significantly different from that of the other groups, family function is considerably worse. The family context has a debilitating effect on all family members, particularly the offspring. In short, the system is inefficient and benefits none of the individual members. Families of female controls are somewhat similar to families of male schizophrenics. Both patients and parents have high individual functioning. The difference between this group and families of male schizophrenics is that the family context does have a beneficial effect on some members: the parents improve when the family works together as a group. However the offspring performs better individually. Families of male controls show a more benign pattern with a similar theme. Families of male controls function well inside and outside the family context. While cognitive sophistication increases in the family context for all members, efficiency is improved only for the parents. As in families of female controls, the patient performs better individually. However family performance is high, and the degree of improvement experienced is greater than that for female control family members. On the far extreme, showing a picture that is, in a sense, "opposite" to that of the family of the male schizophrenic, is the

family of the female schizophrenic. Individual functioning of family members is the poorest of all subgroups. However family functioning is the best of all subgroups. Both parents and patients improve both in efficiency and in proportion of contraints, and both generations improve equally.

Although extrapolation from linear to systems concepts should be made with care, this continuum can be seen as overlapping a continuum from disengagement to enmeshment. Minuchin (1974) has suggested that either extreme can be dysfunctional. The male schizophrenic family in this study would lie on the disengaged pole of the continuum. Minuchin (1974) described the disengaged family as one in which "...members may function autonomously but...lack...the capacity for interdependence" (p. 55). In our study in such families, individual functioning is relatively effective, but the family is unable to function well as a unit. Control families lie in between. The family unit can function effectively. It improves on the individual performance of some members, but not of others. Offspring, in the move towards individuation, develop skills that allow better autonomous functioning, but do, on the cognitive level, improve in the family context. On the other extreme is the enmeshed family. Minuchin (1974) describes such families as one where "...the heightened sense of belonging requires a major yielding of autonomy. ... (The family) discourages

autonomous exploration and mastery of problems" (p. 55). The individuals in the family of the female schizophrenic in this study have perhaps as difficult a time with individual functioning, as families of male schizophrenics have with the family context. The autonomy of the individual is totally sacrificed for the maintenance of the family as an effective functioning unit, and neither offspring nor parents can function at a high level outside the context of the unit.

It is notable that it is in families of female patients that the picture suggests enmeshment, and disengagement is resembled in families of male patients. The role socialization of the identified patient may play an important part in this correlation. Enmeshment can be hypothesized as being an alternative which is more consistent with the socialization of females. Closeness, passivity and suppression of the force to individuate are encouraged in traditional social roles for females. Independence and isolation, the external manifestations of the disengaged family environment, are acceptable aspects of traditional masculine roles.

Interaction of diagnosis with number of parents.

The results for the four different groups in the various categories for dependent measures will be described, and this will be followed by a discussion of these results.

Means are presented in Table 12 (p. 121).

Efficiency. Single parent mothers of schizophrenics have fewer constraints in the individual session (iv) than mothers of intact families of schizophrenics, whereas single control mothers have a higher proportion of constraints in the individual session than control mothers in intact families. Overall family efficiency is least for single-parent families of schizophrenics patients, although these results do not reach significance.

Family structure. Single-parent mothers of schizophrenics have lower choice fulfilment than single-parent mothers of controls. In intact families, the choice fulfilment scores for the parents in the different diagnostic groups are closer together, have the opposite relationship, and have a value in between those for single-parents. Spontaneous agreement is lower in single-parent families of schizophrenics compared to single-parent families of controls. In intact families, spontaneous agreement is lower for both groups compared to single-parent families, and families of schizophrenics have slightly more spontaneous agreement than families of controls.

Communication patterns. The interaction for premature closure in offspring is remarkable. When patients alone are considered, schizophrenics in single-parent families have premature closure scores more than twice that of any

Table 12

Means of Family Interaction Variables for the Interaction of Diagnosis with Number of Parents

	C1[a]	C2[b]
Schizophrenic	.30	.48
Control	.43	.38

Mother's Constraints

	C1	C2
Schizophrenic	35.3	26.6
Control	29.5	25.8

Family Efficiency

	C1	C2
Schizophrenic	29.9	32.4
Control	34.1	30.6

Mother's Choice Fulfilment

	C1	C2
Schizophrenic	17.6	14.9
Control	21.7	13.6

Spontaneous Agreement

	C1	C2
Schizophrenic	19.6	7.9
Control	8.6	8.7

Patients' Closure Score

	C1	C2
Schizophrenic	12.0	4.7
Control	6.6	3.5

Parents' Closure Score

a: single-parent family members
b: two-parent family members

other group. Overall, there is more premature closure in single-parent families of schizophrenic patients compared to intact families, and more in intact control families than in schizophrenic single-parent control families.

These data suggesting a difference between single-parent families of schizophrenics and of controls, elaborate on the

data from the main effect of number of parents. Single-parent families were found to be less efficient than intact families. The means from the separation of single-parent families according to diagnostic group indicate that the inefficiency is due primarily to the single-parent families of schizophrenics.

The mothers' choice fulfilment score is lower, and premature closure by patients and parents is higher in single-parent families of schizophrenics compared to single-parent control families. This suggests again that it is primarily in single-parent families of schizophrenics that rule breaking takes place at a high level. The mothers' lower choice fulfilment scores in single-parent families of schizophrenics compared to single-parent control families, corroborate the hypothesis presented earlier, that this rule breaking on the part of the offspring is accompanied by the parent's inability to control and influence the family decision making process.

How does this pattern relate to family models of pathology? Minuchin (1974) describes one of the functions of the parental subsystem as being executive, and involving the differential use of authority. He states that in order for a child to grow and develop autonomy, parents must exercise their "responsibility and obligation to determine family rules" (p. 59). This provides an environment where the child can learn to negotiate in situations of unequal power

which is an essential accomodation in eventually developing autonomy. In our study, in single-parent families of schizophrenics, this aspect of the parent-child relationship appears to be lacking.

On an interpersonal level, premature closure can be seen as "rule breaking", or as an interaction in a family where the differential use of authority across generations is poorly maintained. There are also possible implications on the individual level. A family member who has attentional difficulties which result in a low tolerance for ambiguity will be more likely to obtain closure prematurely. Along the same lines, a family member may be responding to a deficit in stimulation, possibly due to a low arousal level, and premature closure would serve to alter the environment and increase the possibility of arousing stimuli.

Interaction of sex of patient with number of parents.

Means for the four groups are presented in Table 13 (p. 124). Significant effects were found on two measures: premature closure (xi) and choice fulfilment (xvi).

It is in single-parent families of males that premature closure is mot frequent and choice fulfilment for all members is the lowest. When parents along, and mothers alone are considered, this group remains the least fulfilled.

In single-parent families of females, even though premature closure takes place at a high level, choice fulfil-

ment is also the highest of all groups overall.

These results point to the vulnerability of the mother-son dyad and perhaps a special resource of the mother-daughter dyad. It is in single-parent families of male patients that rules are broken most frequently, and yet all members lack the correspondence between individual choices and the family's decision. In single-parent families of female patients, the "enmeshment" picture is repeated. While rules are broken, fulfilment of choices within the family are high.

The single-parent family of the male schizophrenic.

A group that attracts particular attention in the ABC interaction is the single parent family of the male schizophrenic patient. It is notable that on eight measures (ii, iii, v, vi, vii, xi, xiv, and xvi) this family type receives the most deviant scores of all eight groups. It is the lowest in efficiency, having the lowest mean proportion of constraints among questions, and taking the highest number of questions to solve the 20 Questions task as a family. Efficiency and proportion of constraints decrease in the family context to the greatest extent of all groups. Choice fulfilment is lowest overall. Amorphousness and premature closure are highest. Thus this kind of family is the least efficient, its members suffer most negative effects in the family context, they have the least degress of similarity

between family and individual choices, and they have the highest communication deviance. This constellation incorporates all the effects described earlier of having a schizophrenic patient who is male, and having a single-parent head of household. The male schizophrenic and his mother form a particularly disturbed dyad. The reasons for this are not clear, but are worthy of speculation.

Is it the lack of a role model which places the son at a disadvantage? The effects emerge in a triple interaction, and it is the schizophrenic and not the nonschizophrenic psychiatric control who shows the effect. The measures were selected to maximally separate schizophrenics. The controls may have shown other problems. We have no information as to whether the single-parent mother-son dyad is more potent in producing schizophrenia, but it should be recalled that the mother-daughter dyad, despite a low level of communication deviance, can still produce schizophrenia. Family constellation characteristics may be independent of the transmission of schizophrenia. However, it would seem prudent to provide the mother-son schizophrenic dyad with special attention. The clinical implications of this special vulnerability in the mother-son schizophrenic dyad will be considered in the final chapter.

Integrative summary

Families of schizophrenic patients differ from families

of psychiatric controls along several dimensions. Schizophrenic patients are less efficient than their parents, unlike in families of controls. There is more communication deviance in families of schizophrenics, and this is particularly true when schizophrenic parents are compared to control parents. While family functioning is maintained at an effective level, this is generally due to the contributions of the parents rather than improvement in the functioning of patients. In families of controls, in contrast, both parents and offspring contribute to family functioning.

When families of schizophrenics are separated into groups according to the sex of the identified patient, it is found that families of female patients function at a higher level than families of male patients. Families of schizophrenic females function together even better than families of female controls. Choice fulfilment of individual members is high, in spite of the fact that there is a high level of communication deviance in the families. The data reviewed suggest that the family unit functions too well in a sense, and this high level of group functioning is at the cost of individual functioning outside the family context. Measures of interaction in families of schizophrenic females suggest an "enmeshed" pattern.

Single parent families with schizophrenic patients have a particular difficulty in functioning together, showing

less choice fulfilment for individual members in the family context, and more communication deviance. Such families seem to be characterized by a difficulty on the part of the offspring in functioning as part of the family group involved in joint decision making, and ineffectiveness on the part of the parent in maintaining an influence over family functioning.

The family constellation that emerges as the most disturbed of the eight groups examined is the single-parent family of the schizophrenic male. On the majority of measures, this family compares least favorably to other groups. The interaction patterns resemble relationships in effect in "disengaged" families.

Relationships between dependent variables.

The relationships between measures and their implied relationships to the underlying contructs of family interaction which appear in Table 10 (p. 95) will be explored in this section. Correlations between measures within each category will be discussed first, and this will be followed by a consideration of correlations between categories.

Efficiency. Effectiveness in individual function (i) appears related to cognitive sophistication in the individual session (iv). There is a highly significant correlation between sophistication in individual (iv) and family sessions (v). These results support an underlying construct

of efficiency. The significant correlations support the intuitive concept that efficient behavior in a cognitive task is related to the sophistication of the strategy used to tackle the task, and that cognitive sophistication is a stable measure that is relatively constant from one cognitive task situation to another.

Family structure. Measures ix, xii, xiii, and xvi are all measuers of dominance within the family. Measure ix, the number of questions that were rejected by other family members, correlates significantly with the proportion of questions that were accepted (xii). Since these two measures are not independent (measure ix forms part of the denominator of measure xii), the significance of the correlation is somewhat ambiguous. Measures xii and xiii, ix and xiii and ix and xvi do not correlate. The most surprising of the results in this category is the (non-significant) negative correlation between xii and xiii. An increase in both of these measures has been taken to indicate an increase in dominance. The correlation mentioned above suggests that the greater proportionately a member's accepted contribution, the less, compared to other members, this member contributes to the family's questions. While this could clearly hold for inactive, or less active members (if few questions are suggested to the family, none may be rejected, but the individual may not contribute much to the

total), it is less easy to explain for more active members. The relationship would also hold for more active members if in families where a large number of questions are rejected, fewer questions are needed to reach a solution. In this case, the numerator of both ratios would be the same. However, as the denominator of xii would increase (i.e. rejected questions became more frequent), the denominator of xiii would decrease (i.e. the family would need fewer questions to solve the problems). It is an empirical question as to whether the more efficient families are also more selective in allowing questions to be submitted to the examiner.

An additional correlation that does not fit the relationships assumed to exist between measures (e.g. by Wild, et al., 1977), holds between variables ix and xvi. Both of these measures have been considered indicators of dominance, with the choice fulfilment score (xvi) relating directly to dominance, and the rejected contribution score (ix) relating inversely to dominance. Their positive correlation, even though nonsignificant, is puzzling if dominance is considered a unitary construct. One possible explanation is that individuals whose contributions were rejected in the 20 Questions task are more active at trying to influence the family choice during the Ferreira-Winter questionnaire. The system may allow dominance of different members to appear at varying occasions, and there may be a homeostatic effect

with members dominant at certain times having their influence rejected at others. The other not unrelated possibility is that the kind of influence exercised during the Ferreira-Winter questionnaire is different from that in the 20 Questions task. For example, an objective judgment can be made about the cognitive sophistication of the question, but this is not necessarily the case when the kind of decisions to be made in the Ferreira-Winter are faced. A cognitively unsophisticated subject may not be able to convince the family that his or her problem solving skills are effective, but may convince them that fried chicken is better than mashed potatoes for dinner. Overall, these results do suggest that the unitary underlying construct of dominance, as frequently used in the family literature, needs to be reexamined, as there is not good reliability among measures assumed to reflect this construct, and occasionally, there is an inverse relationship between measures when a direct one would have been predicted.

Impact of family. Change scores correlate very strongly with each other. In other words when the family needs fewer questions to solve the task than the individual member does, the member also improves in level of abstraction from the individual to the family session. This suggests that the impact of the family on the individual can be measured with reliability using two different measures.

Communication patterns. Amorphousness (vii) correlates significantly with premature closure (xi), suggesting the appropriateness of considering both these measures as indicators of communication deviance. It is interesting that correction of other family members' amorphousness (viii) does not relate to the other communication measures. It would be reasonable to predict a negative correlation with amorphousness, expecting that the family member who was least likely to lose the task and most able to integrate the information in the situation, may also be most able to clarify amorphousness in others. Correction may relate rather to dominance. The individual who can clarify issues for others may also be the most able to influence their strategy.

Between-category correlations. Individual efficiency (i) correlates with proportionate contribution to the family's questions (xiii). Family members who are best at individual problem solving tasks contribute most to the family's problem solving task. Level of cognitive sophistication in the individual session (iv) correlates with proportion of contribution accepted by the family (xii). Proportion of abstract questions in family sessions (v) also correlates with proportion of contribution accepted by the family (xii). These results indicate that the individuals who are the most proficient, individually and in the family

context, contribute most to the family task.

Contrary to expectation, however, are the relationships between cognitive sophistication in the individual (ix) and family sessions (v), with choice fulfilment (xvi). In both cases there is a negative relationship. While the cognitively proficient individual plays a greater role in determining the family's cognitive strategy, he or she is not influential in the family decision making situation presented in the Ferreira-Winter questionnaire. This supports the postulate presented earlier, that dominance, as measured by influencing the family's decision making process, is not a unitary construct.

There are several significant correlations between measures of impact of the family on the individual, and measures of efficiency and cognitive sophistication. Proportion of constraints in the individual (iv) and family (v) context correlate with improvement in the family session (vi). Change in efficiency (iii) also correlates with cognitive sophistication in the individual and family sessions. This indicates that the family performance of cognitively sophisticated individuals is better than the family performance of the individual less capable of abstraction. These data suggest that the family exercises a positive influence on sophisticated individuals, while concrete, inefficient members benefit less from the family context. It is interesting

that the relationships between individual efficiency (i) and cognitive sophistication (iv) are not as strong as the relationships between sophistication (iv) and improvement in the family context (iii). This would lead to the hypothesis that cognitive abstraction alone does not lead to high efficiency. What other factors are necessary are not obvious from the data. Perhaps the structure and affective environment provided by the family combines with the individual's capacity for sophisticated cognition to result in the best performance.

Dominance measures correlate with change measures. The individual who improves most in the family session (iii) has the largest proportion of contribution accepted by family members (xii). Since the individuals who improve the most are also the ones with the highest degree of cognitive sophistication, their high contribution would contribute to effective function for the family. The relationship between change in efficiency (iii) and choice fulfilment is a negative one. This provides more evidence for the earlier hypothesis that dominance is not a unitary construct. The person who has family scores most improved over individual scores is also the most cognitively sophisticated in individual sessions, and contributes most to the family's questions. This person has a low choice fulfilment score, suggesting that dominance in the 20 Questions task does not indicate

dominance in the Ferreira-Winter situation. Indeed the negative relationship suggests that individuals who are highly influential in one kind of situation have the least influence in the other.

The correlation between premature closure (xi) and questions rejected by the family (ix) suggests that the more the individual's contribution is refused by the family, the more likely he or she is to break the rules of the group interaction by avoiding consensus.

Improvement in efficiency (iii) and abstraction (vi) also correlate with correction (viii). The relationship between dominance indicators (xii, xiii), efficiency indicators (iv, v) and correction of other members communication and attention deficits (ix) all support the earlier hypothesis that correction relates less to communication pattern styles than that it indicates a position of influence over family members.

In summary, the efficiency indicators correlate well together, suggesting that the concept is a unitary and reliably measurable one. Dominance scores fall into two categories: the ones obtained from the 20 Questions Task, and choice fulfilment from the Ferreira-Winter. The correction score has a high correlation with the other dominance indicators from the 20 Questions task. The other indicators

from the 20 Questions task do not correlate well together. This does not indicate, however, that they do not relate to the underlying construct. Together, they may give a more accurate indication of dominance than any one score does individually. That this may be the case is suggested by their strong relationship to the correction score which may be the single score most reflective of the underlying construct. The choice fulfilment measure does not fit in a parallel fashion with the other scores. Indeed, there is a consistent negative correlation with the 20 Question indicators. There could be at least two explanations for this finding. The first possibility is that either the Ferreira-Winter score, or the other measures do not measure dominance. This goes against the common sense notion that the individual who is able to influence family's choices is dominant within the family. In both the 20 Question measures and the choice fulfilment measure, influence on family's choices is being measured. The second possibility is that dominance within the family is not a consistent, unitary construct. Different family members may be dominant in different situations, or spheres, or on different topics. There may even be a sharing of dominance between family members, so individuals high in influence at particular times may be low at others. This latter possibility is most consistent with the data.

Measures of the impact of the family on the individual

correlate well together, as do measures of family communication patterns, except for the correction score (viii), which it would seem more appropriate to categorize under family structure variables rather than communication pattern measures.

These data give a picture of family function that suggests that the family context is beneficial and helpful primarily to cognitively sophisticated family members. The family functions as a system by allowing the most efficient to contribute the most. Individuals who are major contributors on problem solving tasks, do not exercise the same influence on the family in a decision making task involving likes and dislikes. Individuals who had the most influence in the former situation tend to have the least influence in the latter.

Finally, these data point to the possiblity of the use of such a design to obtain differences in functioning of different groups. Separate analyses for the different subgroups might yield useful information about family functioning in the different groups, and also suggest testable hypotheses.

C H A P T E R I V

EXPERIMENT II: MAO ACTIVITY IN PARENTS OF SCHIZOPHRENICS

Method

Subjects

The subjects consisted of 11 biological parents of hospitalized schizophrenics and 12 parents of psychiatric controls. The control patients whose parents participated in this aspect of the study had received diagnoses of major depressive disorder (3), minor depressive disorder (3), bipolar depression with mania (1), mania disorder (1), alcoholism (2) and other psychiatric disorder (2). These subjects (except for two control parents) were a subset of the parents who had participated in Experiment I. All parents were contacted during or after the family interaction aspect of the study and their participation was requested in the biological aspect of the study. Two parents participated in the biological aspect alone, withdrawing from the study before the family interaction data had been gathered. 60% of the parents who had participated in Experiment I did not participate in the biological study. Four families could not be located after the patient was discharged, and the

remainder who did not participate objected to venipuncture, or to the time demands. Table 14 (p. 141) presents means for age, sex, I.Q. and SES for the two groups.

Table 14

Characteristics of Subjects in Experiment II

	Parent of Schizophrenics	Parent of Controls	Range
Mean Age	54.5 years	53.1 years	42-72 years
Number of Males	4	4	-
Number of Females	7	8	-
I.Q.[a]	11.1	11.9	8-15
SES[b]	4.7	4.8	1.9

a: WAIS Vocabulary scaled score
b: Based on Adult Personal Data Inventory conversion (U.S.H.E.W., 1976)

All premenopausal women had blood samples drawn during the first five days of their menstrual cycle. A number of the subjects were taking medication (see appendix for specific drugs), but none of these fall into the groups of pharmacologic agents associated with alterations in MAO activity (Robinson and Nies, 1980).

Procedure:

With the exception of two subjects in each group, blood samples were collected in the morning and assays conducted blind. Platelets were isolated according to a

modification of the method of Friedhoff, Miller and Karpatkin (1978), which allows for the recovery of 90% of the platelets. This method will be briefly described here. 10 m1. of venous blood was collected and placed in a Nalgene tube that contained EDTA (.5% concentration). Contents were mixed gently and kept on ice. Two 5ml. proportions were pipetted into polycarbonate tubes and platelet-rich-plasma (PRP) was obtained by centrigufing at 100 x g for 15 minutes. The PRP was transferred into another polcarbonate tube, and the blood cells were washed to obtain the remainder of the platelets. The wash consisted of two ml. of isotonic buffer (BSG-Citrate) added to each tube and gently mixed in. The tubes were spun at 600 x g for three minutes. The buffer and platelets were removed and added to the PRP. The wash was repeated three times. This yielded three tubes containing approximately 90% of the platelets from the 10 ml. of whole blood.

These tubes were spun at 2,500 x g for 30 minutes. The plasma was discarded. Red blood cells contaminating the platelet pellet were lysed by an addition of a total of two ml. water, and one ml. biological saline (2.7%). The tubes were spun again at 10,000 x g for 10 minutes. The saline was discarded, and the pellets combined. This was followed by lysing by homogenization for three minutes in a ground glass microhomogenizer in one ml. of water.

The resultant platelet homogenate was recentrifuged at 100,000 x g for 10 minutes, in order to obtain the particulate fraction, including the mitochondria which contained 90% of the MAO activity. The platelet particulate pellet was then homogenized in .2ml. of .05 M phosphate buffer, (ph 7.4). The platelet homogenate was assayed for protein using folin phenol reagent, according to the method of Lowry, Rosebrough, Farr and Randall (1951). MAO specific activity (SA) was determined using a modification of the method of Wurtmen and Axelrod (1963). 14C-Benzylamine (ICN, SA 4 Ci/mmole) was used as a substrate at .5mM. MAO SA were expressed as nanomoles of 14 C-aldehyde formed per hour per mg. platelet particulate protein.

Results

Mean MAO activity for parents of schizophrenics was 36.91 nanomoles/mg/hour (standard deviation 15.76) and for parents of controls was 54.1 nanomoles/mg.hr (standard deviation 36,27). The Cochran test for homogeneity of variance (Winer, 1971) indicated that the variance for the groups was not homogeneous. For this reason, a non-parametric statistic (the Mann-Whitney U) was calculated to assess differences between the groups in MAO levels. The populations were found not to be significantly different, although as the means indicate, the differences were in the

predicted direction.

Discussion

The variance of the distribution of MAO activity levels is smaller in the population of parents of schizophrenics than for parents of controls. If low MAO activity is considered a marker of vulnerability to schizophrenia (Wyatt, et al., 1973), this heterogeneity of variance may be attributable to the fact that some control parents (and their offspring) may carry the genotype for vulnerability without expressing the phenotype of schizophrenia. Thus the popoulation of parents of schizophrenics would overlap a portion of the population of parents of controls. However, control parents would be spread both inside and outside the vulnerability range, and their MAO activity levels would have a larger variance.

The hypothesis that parents of schizophrenics have lower MAO activity than parents of controls was not confirmed by the data. However the trend was in the predicted direction, and it is possible that the patients' level of MAO activity is systematically lower than their parents'.

It is important to note that there were several possible factors that contributed to the lack of significance of the trend. The prediction of the difference was made because of the finding that schizophrenic patients have

lower MAO than certain control groups (see literature review). The lack of significance in the results may relate to the fact that relatives of patients, rather than the patients themselves were being examined, and that the control group consisted of psychiatric patients. These possiblilities will be further developed below.

The genetic pool of parents is, of course, larger than the genetic inheritance of their offspring. From the parents' genetic pool, both schizophrenic and nonschizophrenic offspring result. The consideration of the enzymatic activity in parents as a means of corroborating differences between patients is a more stringent test of the hypothesis that schizophrenic patients have lower MAO activity than nonschizophrenic psychiatric patients. A number of the parents in the study were single parents, and the other parent of the offspring was not available. Error was added to the measures because assuming that MAO level was inherited from one parent, there was a 50% chance that it was the other parent whose activity was being measured.

The group for comparison consisted of parents of psychiatric controls. Among other diagnoses, the offspring of these subjects had received diagnoses of alcoholism and bipolar affective disorder. Such patients have also been found to have lowered MAO activity (see literature review).

The finding that parents of schizophrenics and parents of psychiatric controls have similar MAO activity is not inconsistent with the finding.

In summary, our results are not inconsistent with the hypthesis that MAO activity levels are lower in schizophrenics compared with psychiatric controls. Our purpose, in this study, was to begin to examine the relations among biological measures and family communication measures. Those issues are discussed in the next section.

CHAPTER V

EXPERIMENT III: THE RELATIONSHIP BETWEEN FAMILY INTERACTION VARIABLES AND MAO ACTIVITY

Method

Subjects

The subjects were 11 biological parents of schizophrenic patients, and 10 biological parents of psychiatric controls, all of whom had participated in Experiments I and II.

Procedure

A corrleation analysis was undertaken to determine the relationship between MAO activity and individual family interaction measures. Parents of schizophrenics and controls were initially considered as separate groups in determining the correlations. The third analysis pooled the data from all subjects.

On each dependent variable the correlation for parents of schizophrenics was compared to the correlation for parents of controls in order to determine if the difference was significant. This was done by the Fisher R to Z transformation, and comparison of Z scores.

Results

Table 15 (p. 144) presents the correlations between MAO activity and dependent measures for parents of schizophrenics (I), parents of controls (II), and the total group (III). Correlations significant at the .05 level are indicated by an asterik.

Table 15

Correlations Between MAO Activity and Family Interaction Variables

score:[a]	(i)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(xi)	(xii)	(xiii)	(xvii)
I	-.39	-.14	.37	-.23	-.74*	-.09	.09	.39	.06	-.34	.31	-.18
II	-.57*	-.07	.31	.44	.48	.06	-.27	.21	-.66*	-.52	-.12	-.07
III	-.44*	-.08	.32	.28	.05	-.18	-.13	.14	-.41*	-.43*	.04	-.00

*: significant at .05 level
a: see Table 2 for description of scores

In parents of schizophrenics, there is a very high correlation (-.74) between MAO activity level and improvement in abstraction from individual to family context. Individuals with high MAO improve less in cognitive functioning from individual to family sessions. Among parents of controls, this same correlation does not hold, and there is an insignificant correlation in the opposite direction.

For parents of controls, there is a correlation approaching significance with efficiency (-.57), with individuals with low MAO activity performing more efficiently.

There is also a negative correlation (-.66) with a tendency for premature closure, with individuals with low MAO showing more indications of premature closure. A negative correlation approaching significance (-.52) was found with the dominance ratio, indicating that individuals with low MAO have a higher proportion of their contributions accepted by other family members.

When the data from both groups are pooled, there is a significant correlation (-.44) with efficiency, with individuals with low MAO activity performing at higher levels of efficiency. There are negative correlation with premature closure (-.41) and the dominance ratio (-.43), with individuals with low MAO having a higher tendency for premature closure, and more of their contributions accepted by family members.

The difference between correlations for parents of schizophrenics and parents of controls reached significance only on one dependent variable. This variable is improvement in cognitive sophistication from the individual to the family context. Parents of schizophrenics improve as MAO decreases, parents of controls improve as MAO increase, and the difference is significant ($p < .02$). The difference between the correlations of premature closure with MAO activity appraches significant ($p < .12$), as it does for the correlation between cognitive sophistication in the family

session and MAO activity ($p < .18$). The individual scores for these 3 correlations are plotted in Figures 3-5.

Figure 3 (p. 148) plots the scores on improvement in the family session against MAO levels. For both groups, the correlation does not appear to depend upon a small number of deviant cases. However scores for parents' of schizophrenics change in contraints occupy a wider range than scores for parents of controls. Almost half the scores for parents of schizophrenics fall outside the range for parents of controls.

Figures 4 (p. 149) and 5 (p. 149a) present the relationship of contraints in the family session and premature closure to MAO activity. Again, the relationships do not appear to be dependent on a few deviant scores.

Discussion

It is best to start the discussion of these results with a cautionary note. The treatment of the data in this section is innovative, and reflects a departure from generally accepted models of psychopathology. The conclusions must be tentative since they are based on data from a relatively small sample of subjects. The intention of this aspect of the investigation is less to come up with definitive statements about the etiology of schizophrenia or the relationship between particular biological and environmental variables, than it is to point to a methodology and a para-

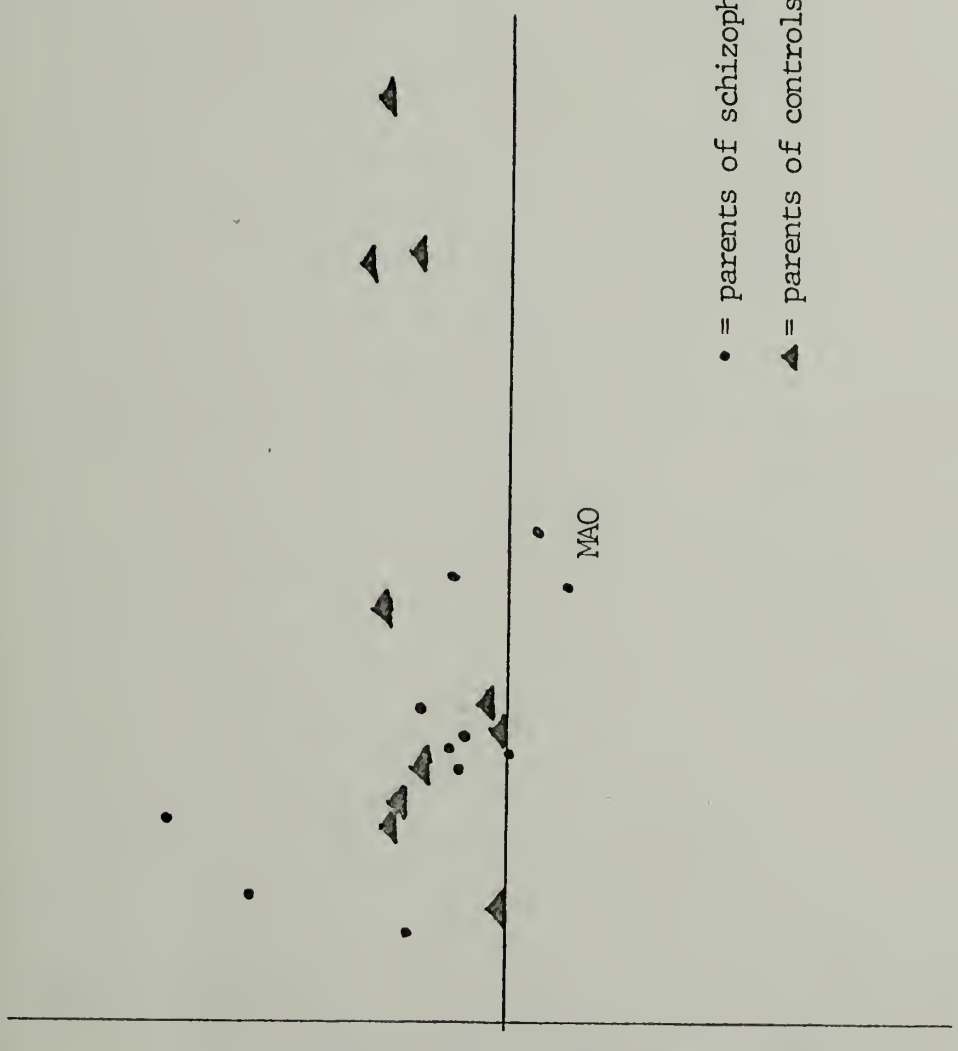

Figure 3. The relationship between improvement in the family context and MAO activity in the parents.

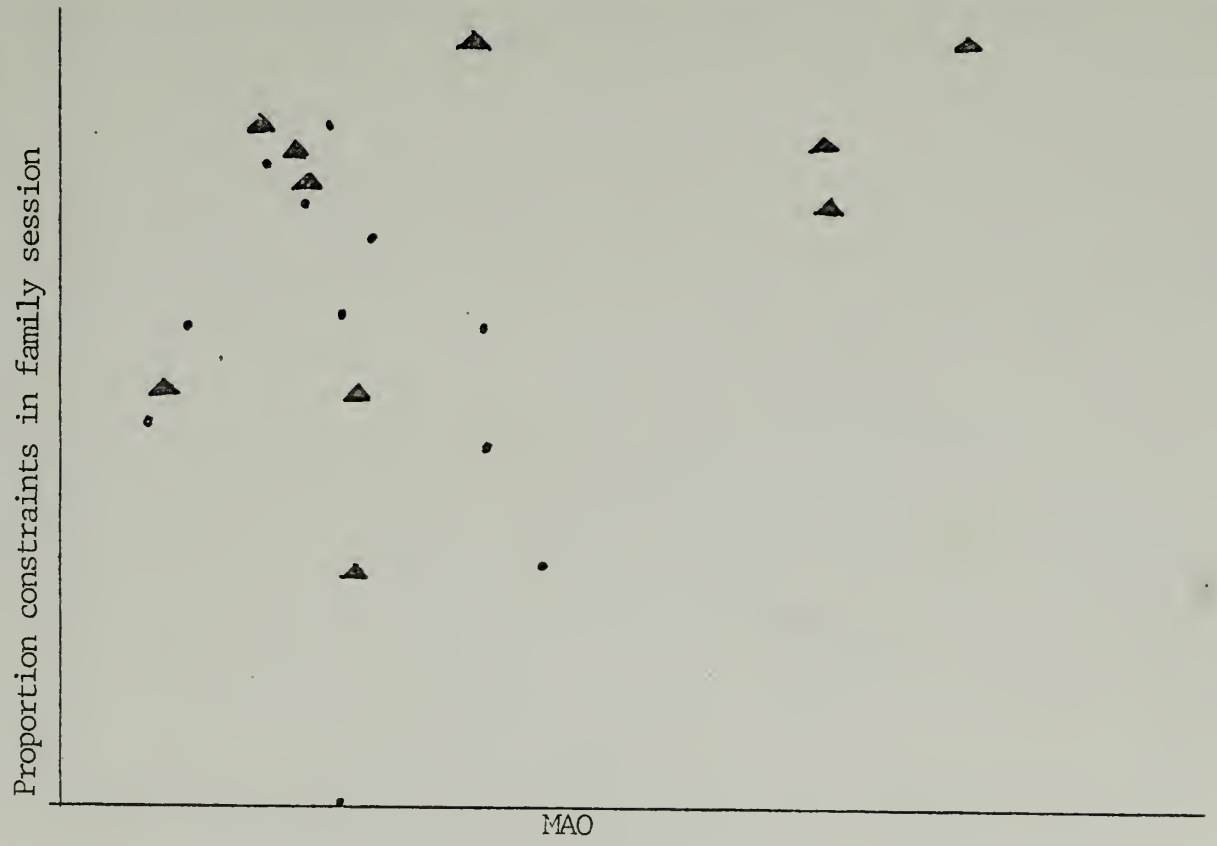

Figure 4. The relationship between constraints in family session and MAO activity in parents.

• = parents of schizophrenics

▲ = parents of controls

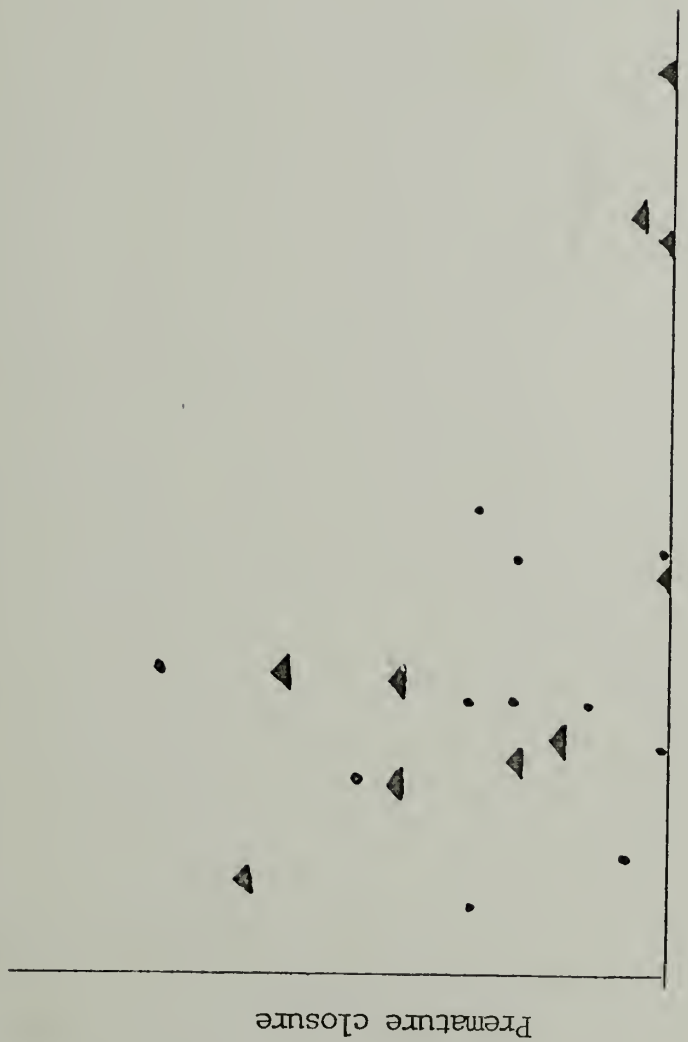

Figure 5. The relationship between premature closure and MAO activity for parents.

• = parents of schizophrenics

▲ = parents of controls

digm that merits further testing, and reflects a development in the study of schizophrenia. It demonstrates a different method of examining data and developing hypotheses. As such, this analysis is primarily heuristic.

The data indicate that parents of schizophrenics benefit from the family context over the individual situation as their MAO activity decreases. Parents of controls show the opposite relationship. Parents of controls perform better individually and show less communication deviance as MAO activity increases.

There are several possible ways of integrating biological and family data into models of schizophrenia.

One model would emphasize the relationship between biological substrates and schizophrenia. From this point of view, a biological deviance reflects an underlying deficit. When the individual has to rely on the functioning of the biological system that carries this deficit, the system malfunctions, and schizophrenic symptoms result.

This model can be developed further to relate to the particular parameters examined in this study. Low MAO activity would correlate with high levels of dopamine, as MAO is the enzyme that metabolizes dopamine (see literature review). Increased dopaminergic activity has been linked to schizophrenic symptoms (Snyder, et al., 1976). High dopamine turnover has been linked to environmental stress

(Iversen, 1977). If an individual with low MAO is in an environment that is stressful, requiring high dopamine turnover, schizophrenic symptoms may results. This stress may come from the family system: high amorphousness on the part of a parent may result in high dopaminergic neuron activity, and because of the deficiency in the metabolizing enzyme, the excess dopamine may be chanelled into the methylation shunt.

Such a model would not explain the possible advantages of low MAO. Clearly there are some advantages: the family has a positive effect on parents of schizophrenics who have low MAO activity.

A model that would incorporate such observations, and interface a systems concept of pathology, can be developed from the data. Haley (1980) has considered the family system's resistance to the separation of offspring an essential aspect of psychotic symptomatology. Low MAO may have distinctive effects on particular family members, making it more likely that separation from the system by other members is discouraged. This would fit in with the observation that low MAO levels in the parents of schizophrenics correlate with improvement in functioning in the family context over the individual context. In other words, the lower the MAO, the more the family environment is beneficial over the individual environment, and the more the

individual is likely to resist change in the family system. Parents with high MAO however, do well individually, and may be less likely to resist the system that allows offspring to separate.

Thus the interactions in a family system may be more beneficial to particular family members than others. Haley (1980) has conceptualized the offspring's deviance as a "sacrifice" (p. 40) in the service of protecting and maintaining the family system. This sacrifice is intended to avoid the emergence of parental conflict. We have seen that the family system provides benefit to the parents over the individual context. Is there evidence for the "sacrifice" of the offspring in our data? In other words, do we have any indication that low MAO, corresponding to benefit for the parent of the schizophrenic, also corresponds with poor functioning on the part of the offspring?

In order to investigate this possibility, the relationship between parental MAO activity, and some measures of the offspring's performance were determined. Table 16 presents these correlations.

Table 16

Correlation Between Parental MAO and Patient's Performance

	(i)	(iv)	(v)	(vi)	(vii)
Schizophrenics	-.59*	.47	.15	-.29	-.41
Controls	.21	.43	.47	.11	.37

*: significant at .05 level
a: see Table 2 for description of scores

The only correlation which reaches significance in this set of data is between parental MAO and offspring's individual efficiency. The correlation for control patients, though insignificant, is in the opposite direction. The difference between the correlations for schizophrenic patients and for controls approaches significance ($p < .10$). There is a strong (though not significant correlation between parental MAO and schizophrenic patient's amorphousness in the family session. The correlation is in the opposite direction for control patients. The difference between these two correlations appraoches significance ($p < .12$). Figure 6 (p. 154) plots patients' efficiency against parental MAO, and Figure 7 (p. 155) plots patients amorphousness against parental MAO.

Thus, while parents of schizophrenics also have a similar correlation between MAO levels and individual efficiency, the correlation with amorphousness is in the opposite direction. As parental MAO decrease, both patients and parents are less efficient in the individual context and improve in the family context. Mean improvement for parents (.21) is greater than mean improvement for schizophrenics (.15) from the individual to the family context. However, while parents have a positive correlation of their MAO activity level with amorphousness, patients have a negative correlation with parental MAO and amorphousness. All these

Figure 6. The relationship between patient's individual efficiency and parental MAO.

• = schizophrenics ▲ = controls

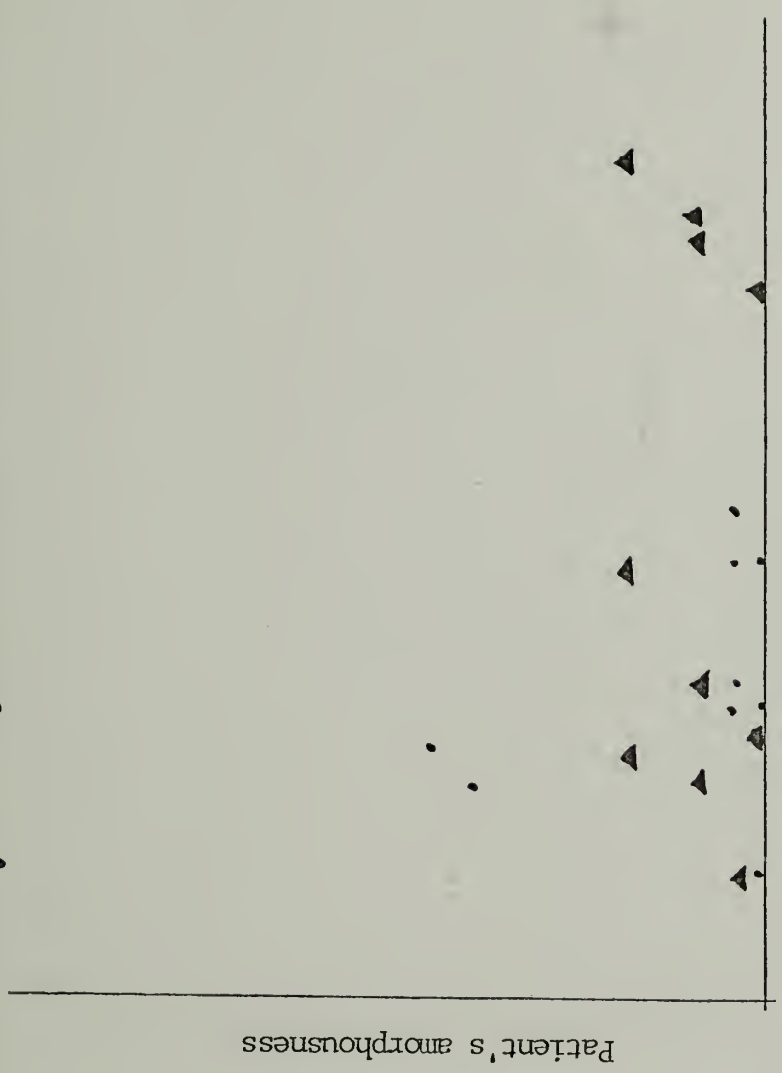

Figure 7. The relationship between patient's amorphousness and parental MAO

• = schizophrenics ▲ = controls

relationships suggest that in families of schizophrenics, as parental MAO decreases, individual efficiency decreases and the offspring's deviance increases. In control families, on the other hand, as parental MAO levels increase the patient's individual efficiency decreases and communication deviance increases. These data suggest that while low MAO activity may have particular benefit for the parent of the schizophrenic, it relates to high deviance in the offspring. The relationship appears to be a little different in families of nonschizophrenic patients. In such families, high parental MAO relates to high individual efficiency for the parent, and low individual efficiency and high communication deviance for the offspring.

These data suggest a model incorporating an interaction between transmission of vulnerability to schizophrenia and parental MAO levels. An individual with low MAO and the ability to transmit schizophrenia, experiences an advantage in the family situation. However the offspring, if they are schizophrenic, have a disadvantage in the family context. An individual with high MAO, not carrying the gene for schizophrenia, experiences an advantage in the family situation; but the offspring show a disadvantage. This model, acknowledging the possibility of advantage linked to the gene for schizophrenia suggests a mechanism for the maintenance of vulnerability to schozophreia in the gene

pool. Individuals carrying this vulnerability and not showing the disorder, benefit from the family environment, thus seeking it and perpetuating the vulnerability.

Even though the two models described above incorporate both biological and family interactional factors, they are unidimensional. In the first case, the individual's symptoms are seen as an inability to rapidly metabolize dopamine. In the second case, low MAO "makes" parents resist the separation of the offspring from the family system.

The third possibility is a model that emphasizes the interaction between biological substracts and family system functioning as determinants of behavior. Perhaps low MAO does not directly affect the performance and behaviors measured in the family interaction aspect of this study. Rather low MAO may have a more subtle affect on the individual's attentional, arousal and orientational processes. This MAO based "style" will then be conditioned and chanelled into behavior by other factors, such as the family system. In such a system it is entirely conceivable that MAO levels, or catecholoamine turnover are resposive to experiential factors. Thus the family and biology interact at a level prior to the formed expression of behavior conceptualized as schizophrenic.

In this model the performance measured on our tests

would be considered a product of the family variables conditioning and modulating the stylistic variables. Low MAO, in of itself, is not likely to "cause" schizophrenia or poor or efficient performance on group cognitive tasks. But the stylistic variables, for which it is a substrate, will interact with family conditioning factors, and it is the product of this interaction that is measurable. This model would be consistent with our finding that MAO levels correlate differently with family interaction variables in families of schizophrenics than in families of controls.

In this section, the relationship between data from different levels of investigation have been considered. Possible models for integrating the different levels in drawing suggestions about the nature of schizophrenia, have been suggested. The building of relationships between these levels, and concepts integrating these relationshps have been proposed. The tentative nature of these models, the need to test them and to develop and test further such heuristic devices is acknowledged again.

C H A P T E R V I

SOME CLINICAL AND RESEARCH IMPLICATIONS

Clinical Implications

The results of this study replicate and extend past findings in the field. Previous research has been with two-parent, male patient families. Our findings replicated this work on family interaction, employing several methodologies that have been used by other researchers. The measures from the different methodologies that have been presumed to correlate to the same underlying constructs were not always found to correlate in our study. However this seems less due to a lack of reliability than to the expression of a multivariate process.

We have extended previous work to single-parent and female patient families. Here again, we find that differences between schizophrenic patients and control patients are largely maintained independent of the sex of the patient and the number of parents in the household. However as we come to evaluate one-parent families, we find that the dysfunctional patterns are most strongly associated with the single-parent family of the schizophreic male. Unfortunately virtually all of our single-parent families are 'father

absent', so that the role of the patient's sex is not clear. It is reasonable that there would be an interaction between patient's sex and parent's sex, and our study was not designed to explore this. However the data suggest some patterns in the family constellations that we examined, and these findings may have some important tentative implications for the treatment of patients.

Most generally, the data point to the need for awareness that behavior patterns may be linked not just to individual pathology, but also to family structure variables. For example, there appears to be a relationship between single-parent family functioning and communication deviance. The clinician who is unaware of this relationship may overestimate the degree of pathology in the family member, and/or may misdiagnose on the basis of symptoms alone.

More specifically, the relationship between sex of patient and family boundaries has implications for the clinican preparing to treat the family with a schizophrenic patient. Munuchin (1974) sees one of the roles of the therapist as a "boundary maker" (p. 56). In a disengaged family, the therapist's task is one of "opening inappropriately rigid boundaries" (p. 56) and in an enmeshed family, it is one of "clarifying diffuse boundaries (p. 56). The therapist aware of the sex-related pattern and its tie to clinical intervention would be better prepared in both the

diagnostic and treatment phases.

Finally, the particular vulnerability of the male schizophrenic and his single-parent mother deserves special attention. In contrast to the female patient in the same position, this kind of family constellation appears particularly disturbed. The clinician involved with such a family would be wise to consider the need for special supports for the parent and child when treatment and discharge are planned. The likelihood of hierachical distrubances in such families suggests a point for clinical intervention.

On the other hand, the female schizophrenic and her mother function quite well together. This could reflect special positive resources in this constellation that the therapist could capitalize upon. On the other hand, the harmony of interaction could be misleading. Female schizophrenics clearly, also show disturbance. In family systems' concepts, the harmony in the enmeshed family is at the cost of development of individual autonomy. What looks like supportive interaction may be the basic mechanisms perpetuating enmeshment.

Research Implications

There is clearly a lack of normative data on family interaction. Such data would provide a context for

comparison of family interaction patterns, and could change our current concepts of pathology. In addition, there is a lack of experimental data on the functioning of the entire family as a system. In our study, as in most past experimental studies in the field, dyadic and triadic parent-child interaction was observed. There is a need to develop methods that would allow us to study the system as a unit. While extrapolations from parent-child interaction are reasonable, we lack direct evidence that such interactions would be maintained in the complete system. Along the same lines, it would be enlightening to observe patterns between parents and their "normal" offspring in families where there is a schizophrenic youngster. By studying individuals who are likely to carry a vulnerability to schizophrenia, and yet do not show the disorder, we may obtain a clearer picture of the factors that interact to produce schizophrenia. If the patterns are identical when parents are interacting with their well and disturbed offspring, this would suggest that measures taken do not reflect the essential variables that interact to result in schizophrenia. On the other hand, if differences are found, we may be able to determine the "protective" factors for the well children, and the "stress" factors for the schizophrenic children. These variables may be manipulable, and this kind of investigation may suggest prophylactic measures

for the families at risk for schizophrenia. Finally, the need for the longitudinal study of families is acute, it we wish to tease out etiological from reactive effects. The cross-sectional approach of studying behavior at fixed points in time is probably not the best way to determine the undoubtedly complex interactions that result in schizophrenia. The etiological stresses that impinged on the vulnerable memeber may no longer be present. Or it may be that factors which seem innocuous at this point may have been stressful at a different point because of development-related vulnerability. Such issues may be clarified through a longitudinal approach.

Now that substantive differences have been found and confirmed between schizphrenic and nonschizophrenic families, studies designed to more directly investigate the significance of the variables on which differences exist, woud be important. This could be done to some extent by considering these variables across a larger variety of family structures. The need to consider "normal" families has already been mentioned. In this study we extended observations to families of female patients and single-parent families. While it was not in the scope of this study to look more directly at subtle structural differences, these might provide clues to the relationship between the variables and pathology. For example, our single-parent family group was

defined as families where the patient lived with one biological parent. This included some families in which the parent was "single" due to divorce, others due to death, and others where the parent had never been married. Some patients had never lived with more than one biological parent, others have lived with a number of step-parents, and yet others had lived for many years within a single stable remarriage. Some patients had lived alone with their single biological parent for most of their lives, while in other cases the parent had only recently become single. All these factors would be expected to affect the patterns of parent-child interaction. The observation of the relationships between these differences in family structure to family interaction patterns could help to establish the significance of these measures, and also suggest hypotheses for further testing. For example, poor family functioning could be due to a variety of problems in single-parent families. It might indicate an acute reaction to the loss of an important resource, or it could be indicative of a more deeply entrenched pathological interaction. If it were found that poor functioning was not typical in families where the parent-child dyad had functioned together for a long period of time, support would be gained for the hypothesis that disturbances in functioning were an acute reaction to the recent change in structure. This hypothesis

could then be more systematically explored by following families which had incurred a recent loss for several years and investigating changes in their interaction patterns.

Another, possibly more direct approach to the question of significance of measures would be to use systems methodology. Our study used linear, experimental measures. This approach, compared to the systems approach, has some of the drawbacks of the cross-sectional vs. longitudinal approach considered briefly earlier. We can say little directly about the role of particular behaviors in perpetuating the system when linear measures are taken. The systems researcher would focus on the implications of particular behavors by studying not, as we did, the frequency of amorphous behavior for example, but rather the effect of such behavior on the family system. This would be done by considering the particular behaviors that precede and follow the amorphousness displayed by a family member. In a sense, the systems researchers do short-framed longitudinal studies. Clearly the information from such an approach would provide leads both on etiological variables in the disorder, and treatment and prophylactic methods for vulnerable families.

In the final aspect of this study, an experimental paradigm was proposed. This paradigm, focusing on the interaction between biological and family interaction factors in

schizophrenia, reflects a trend in recent theoretical conceptualizations of schizophrenia. This aspect of the study attempted to translate such a conceptualization into an experimental model. There is clearly a need to develop more sophisticated methodology to test such models.

A systems approach could be the approriate one for testing the interactional model suggested in chapter V. The effects of conditioning factors on the stylistic substrates can only be measured over time and as interaction. The challenge for the systems researcher remains the objectification and quantification of interactional variables. There is clearly a need to meet this challenge, and use this perspective in investigating families of schizophrenics.

BIBLIOGRAPHY

Adler, S.A., Gottesman, I.I., Orsulak, P.J., Kizuka, P.P., and Schildkraut, J.J. Platelet MAO activity: relationship to clinical and psychometric variables. Schizophrenia Bulletin, 6, 227-231, 1980.

Angrist, B., Sathananthan, G., Wilk, S., and Gershon, S. Amphetamine psychosis: behavioral and biochemical aspects. Journal of Psychiatric Research, 11, 19-23, 1974.

Barchas, J.C., Elliott, G.R., and Berger, P.A. Biogenic amine hypotheses of schizophrenia. In J.D. Barchas, P.A. Berger, R.D. Ciaranello, and G.R. Elliott (eds.). Psychoparmacology: From Theory to Practice. New York: Oxford University Press, 1977. pp. 100-120.

Becker, J. and Iwakami, E. Conflict and dominance within families of disturbed children. Journal of Abnormal Psychology, 74, 330-335, 1969.

Becker, R.E., and Shaskan, E.G. Platelet monoamine oxidase activity in schizophrenic patients. American Journal of Psychiatry, 134, 512-517, 1977.

Benjamin, L.S. Structural analysis of differentiation failure. Psychiatry., 42, 1-23, 1979.

Berger, P., Ginsburg, R., Barchas, J., Murphy, D., and Wyatt, R.J. Platelet monoamine oxidase in chronic schizophrenic patients. American Journal of Psychiatry, 135, 95-99, 1978.

Berretini, W.H., Vogel, W.H., and Clouse, R., Platelet monoamine oxidase in chronic schizophrenia. American Journal of Psychiatry, 134, 805-806, 1977.

Brockington, I., Crow, T.J., Johnstone, E.C., and Owen, F. An investigation of platelet monoamine oxidase activity in schizophrenia and schizoaffective phychosis. In G.W. Wolstenholme, and G. Knight (eds). Monoamine Oxidase and its Inhibition. CIBA Symposium No. 39. Amsterdam: Elsevier, 1976, 353-362.

Brown, J.B. Platelet MAO and alcoholism. American Journal of Psychiatry, 134, 206-207, 1977.

Buchsbaum, M.S., Coursey, R.D., and Murphy, D.L. The biochemical high-risk paragdigm: behavioral and familial correlates of low platelet monoamine oxidase activity. Science, 194, 339-341, 1976.

Buchsbaum, M.S., Murphy, D.L., Coursey, R.D., Lake, C.R., and Ziegler, M.G. Platelet monoamine oxidase, plasma dopamine-beta-hydroxylase and attention in a "biochemical high-risk" sample. Journal of Psychiatric Research, 14, 215-224, 1978.

Buchsbaum, M.S., and Reider, R.O. Biologic heterogeneity and psychiatric research. Archives of General Psychiatry, 36, 1163-1169, 1979.

Caputo, D. The parents of schizophrenics. Family Process, 2, 339-356, 1963.

Carlsson, A., and Lindqvist, N. Effect of chlorpromazine and haloperidol on the formation of 3-methoxytyramine and normetanephrine in mouse brain. Acta Pharmacologica, 20, 140-146, 1963.

Carlsson, A., Persson, T., Ross, B., and Walinder, J. Potentiation of phenothiazines by alpha-methyl-tyrosine in treatment of chronic schizophrenia. Journal of Neural Transmission, 33, 83-90, 1972.

Carpenter, W.T., Murphy, D.L., and Wyatt, R.J. Platelet monoamine oxidase activity in acute schizophrenia. American Journal of Psychiatry, 132, 438-441, 1975.

Centerwall, W.R., and Centerwall, S.A. Phenylketonuria: An Inherited Metabolic Disorder Associated with Mental Retardation. U.S. Department of Health, Education and Welfare, 1972.

Cheek, F. The 'schizophrenogenic mother' in word and deed. Family Procees, 3, 155-177, 1964.

DeWitt, K.N. The effectiveness of family therapy: a review of outcome research. Archives of General Psychiatry, 35, 549-561, 1978.

Demisch, L., von der Muhlen, H., Bochnik, H. J., and Seiler, N. Substratetypic changes of platelet monoamine oxidase activity in subtypes of schizophrenia. Archiv fur Psychiatrie und Nervenkrankheiten, 224, 319-329, 1977.

Doane, J. Family interaction and communication deviance in disturbed and normal families: a review of the research. Family Process, 17, 357-376, 1978.

Domino, E.F., and Khanna, S.S. Decreased blood platelet MAO activity in unmedicated chronic schizophrenic patients. American Journal of Psychiatry, 133, 323-326, 1976.

Farina, A., and Holzberg, J. Interaction patterns of parents and hospitalized sons diagnosed as schizophrenic or non-schizophrenic. Journal of Abnormal Psychology, 73, 114-8, 1968.

Feldman, R. Introduction to Neuropsychopharmacology. In press.

Ferreira, A., and Winter, W.D. Family interaction and decision-making. Archives of General Psychiatry, 13, 214-223, 1965.

Ferreira, A., and Winter, W.D., and Poindexter, E.J. Some interactional variables in normal and abnormal families. Family Process, 5, 60-75, 1966.

Ferreira, A., and Winter, W.D. Decision-making in normal and abnormal two-child families. Family Process, 7, 17-36, 1968.

Framo, J.L. Systematic research on family dynamics. In I. Boszormenyi-Nagy and J. Framo (eds). Intensive Family Therapy. New York: Harper and Row, 1965.

Friedhoff, A.J., MIller, J.C., and Karpatkin, S. Heterogeneity of human platelets. VII. Platelet monoamine oxdidase activity in normals and patients with autoimmune thrombocytopenic purpura and reactive thrombocytosis: its relationship to protein density. Blood, 51, 317-323, 1978.

Friedman, E., Shopsin, B., Sathananthan, G., and Gershon, S. Blood platelet monoamine oxidase activity in psychiatric patients. American Journal of Psychiatry, 131, 1392-1394, 1974.

Haley, J. The family of the schizophrenic: A model system. Journal of Nervous and Mental Diseases, 129, 357-374, 1959.

Haley, J. Family experiments: a new type of experimentation. Family Process, 1, 265-293, 1962.

Haley, J. Speech sequences of normal and abnormal families with two children present. Family Process, 6, 81-97, 1967.

Haley, J., Leaving Home, New York: McGraw-Hill Book Company, 1980.

Hollister, L. Drug induced psychoses and schizophrenic reactions: a critical comparison. Annals of the New York Academy of Sciences, 96, 80, 1962.

Horn, A.S. and Snyder, S. Chlorpromazine and dopamine: conformational similarities that correlate with the anti-schizophrenic activities of phenothiazine drugs. Proceedings of the National Academy of Sciences, 68, 2325-2328, 1971.

Iversen, S. Brain dopamine systems and behavior. In L. Iversen, and S.H. Snyder (eds.). Handbook of Psychopharmacology. New York: Plenum Press, 1977.

Iversen, S., and Iversen, L. Behavioral Pharmacology. New York: Oxford University Press, 1975.

Jackman, H.L., and Meltzer, H.Y. Factors affecting determination of platelet monoamine oxidase activity. Schizophrenia Bulletin, 6, 259-266, 1980.

Jacob, T. Family interaction in disturbed and normal families; a methodological and substantive review. Psycohological Bulletin, 82, 33-65, 1975.

Janowsky, D.S., El-Yousef, M.K., Davis, J.M., and Sckerke, H.J. Provocation of schizophrenic symptoms by intravenous administration of methylphenidate. Archives of General Psychiatry, 28, 185-188, 1973.

Joseph, N.H., Owen, F., Baker, H.F., and Bourne, R.C. Platelet serotonin concentration and monoamine activity in unmedicated chronic schizophrenic and in schizoaffective patients. Psychologie Medicale, 7, 159-162, 1977.

Kety, S. Psychoendocrine systems and emotion. In D. Glass (ed.). Neurophysiology and Emotion. New York: Rockefeller Press, 1967, pp. 103-116.

Kety, S.S. Studies designed to disentangle genetic and enviromental variables in schizophrenia: some epistemological questions and answers. American Journal of Psychiatry, 133, 1134-1137, 1976.

Kety, S.S., Rosenthal, D., Wender, P.H. and Schulsinger, F. The types and prevalence of mental illness in the biological and adoptive families of adopted schizophrenics. In A. Rosenthal and S.S. Kety, (eds.). The Transmission of Schizophrenia, New York: Pergamon Press, 1968, pp. 346-362.

Kety, S.S., Rosenthal, D., Wender, P.H., Schulsinger, F. and Jacobsen, B. Mental illness in the biological and adoptive families of adopted individuals who have become schizophrenic: a preliminary report based on psychiatric interviews. In R.R. Fieve, D. Rosenthal and H. Brill (eds.) Genetic Research in Psychiatry. Baltimore: Johns Hopkins University Press, 1975, pp. 147-167.

Kety, S.S., Rosenthal, D., Wender, P.H. and Schulsinger, F. Studies based on a total sample of adopted individuals and their relatives: why they were necessary, what they demonstrated and failed to demonstrate. Schizophrenia Bulletin, 2, 413-428, 1976.

Kleinman, J.E., Potkin, S.G., Rogol, A., Buchsbaum, N.S., Gillin, J.C., Murphy, D.L., Nasrallah, H.A., and Wyatt, R.J. A correlation between platelet monoamine oxidase activity and plasma prolcactin concentrations in man. Science, 206, 479-481, 1979.

Klopper, E.J., Bennett, I.T., Friedman, S., and Hughes, S. A multi-method investigation of two family constructs. Family Process, 17, 83-93, 1978.

Landowski, J., and Afeltowicz, Z. The activity of blood platelet monoamine oxidase and the clinical picture of the paranoid syndrome. Psychiatria Polska, 11, 635-632, 1977.

Lennard, H., Beaulieu, N., and Embry, N. Interaction in families with a schizophrenic child. Archives of General Psychiatry., 12, 166-183, 1965.

Lidz, T. Commentary on a critical review of recent adoption, twin and family studies in schizophrenia: behavioral perspectives. Schizophrenia Bulletin, 2, 402-412, 1974.

Liem, J. Effects of verbal communications of parents and children: a comparison of normal and schizophrenic children. Journal of Clinical and Consulting Psychology, 42, 438-450, 1974.

Loveland, N.T., Wynne, L.C., and Singer, M.T. The family Rorschach: a new method for studying family interaction. Family Process, 2, 187-215, 1963.

Lowry, O., Rosebrough, N.J., Farr, A.L., and Randall, R.J. Protein measurement with the folin phenol reagent. Journal of Bilogical Chemistry, 193, 265-270, 1951.

Major, L.F., and Murphy, D.L. Platelet and plasma amine oxidase activity in alcoholic individuals. British Journal of Psychiatry, 132, 548-554, 1978.

Meltzer, H.Y., and Stahl, S.M. Platelet monoamine oxidase activity and substrate preference in schizophrenic patients. Research Communications in Chemical and Pathological Pharmacology, 7, 419-431, 1974.

Meltzer, H.Y., Arora, R.C., Jackman, H., Pscheidt, G., and Smith, M.D. Platelet monoamine oxidase and plasma amine oxidase in psychiatric patients. Schizophrenia Bulletin, 6, 213-219, 1980.

Minuchin, S., Families and Family Therapy. Cambridge, Massachusetts: Harvard University Press, 1974.

Minuchin, S., Rosman, B.L. and Baker, L. Psychosomatic Families. Cambridge, Massachusetts: Harvard University Press, 1978.

Mishler, E., and Waxler, N. Interaction in Families: An Experimental Study of Family Processes and Schizophrenia. New York: Wiley, 1968.

Morris, G., and Wynne, L.C. Schizophrenic offspring and parental styles of communication. Psychiatry, 28, 19-44, 1965.

Mosher, F.A., and Hornsby, J.R. On asking questions. In J. Bruner, R. Oliver and P. Greenfield (eds). Studies in Cognitive Growth. New York: Wiley Press, 1966.

Mountcastle, V.B. Medical Physiology. St. Louis: C.V. Mosby Company, 1974.

Murphy, D.L., and Wyatt, R.J. Reduced monamine oxidase activity in blood platelets from schizophrenic patients. Nature, 238, 225-226, 1972.

Murphy, D.L., Belmaker, R., and Wyatt, R.J. Monoamine oxidase in schizophrenia and other behavioral disorders. Journal of Psychiatric Research, 11, 221-247, 1974.

Murphy, D.L., Donnelly, C.H., Miller, L., and Wyatt, R.J. Platelet monoamine oxidase in chronic schizophrenia. Archives of General Psychiatry, 33, 1377-1381, 1976.

Murphy, D.L., Belmaker, R., and Buchsbaum, M.S. Biogenic amine related enzymes and personality variations in normals. Psychological Medicine, 7, 149-157, 1977.

Murphy, D.L., Belmaker, R., Capenter, W., and Wyatt, R.J. Monoamine oxidase in chronic schizophrenia. British Journal of Psychiatry, 130, 151-158, 1977.

Murphy, D.L., and Buchsbaum, N.S. Neurotransmitter related enzymes and psychiatric diagnostic entities. In R.L. Spitzer and D.F. Klein (eds.). Critical Issues in Psychiatric Diagnosis. New York: Raven Press, 1978.

Murphy, D., and Kalin, N.H. Biological and behavioral consequences of alteration in monoamine oxidase activity. Schizophrenia Bulletin, , 335-367, 1980.

Murrell, S., and Stachiowak, J. Consistency, rigidity and power in the interaction patterns of clinic and nonclinic families. Journal of Abnormal Psychology, 72, 265-272, 1967.

Napier, A., and Whitaker, C. The Family Crucible. New York: Harper Row Rublishers, 1978.

O'Connor, W., and Stachiowak, J. Patterns of interaction in families with low-adjusted, high-adjusted and mentally retarded members. Family Process, 10, 229-241, 1971.

Olson, D.H. Marital and family therapy: integrative review and critique. Journal of Marriage and the Family, 32, 501-538, 1970.

Orsulak, P., Schildkraut, J., Schatzberg, A.F., and Herzog, J.M. Differences in platelet monoamine oxidase activity in subgroups of schizophrenic and depressive disorder. Biological Psychiatry, 13, 637-645, 1978.

Palazzoli, M.S., Cecchin, G., Prata, G., and Boscolo, L. Paradox and Counterparadox. New York: Jason Aronson, Inc., 1978.

Pollin, W., and Stabenau, J.R. Bilogical, psychological and historical differences in a series of monozygotic twins discordant for schizophrenia. In D Rosenthal and S.S. Kety (eds.). The Transmission of Schizophrenia. Oxford: Pergamon Press Ltd., 1968. pp. 317-332.

Post, R.M., Fink, E., Carpenter, W.T., and Goodwin, F.K. Cerebrosphinal fluid amine metabolities in acute schizophrenia. Archives of General Psychiatry, 32, 1063-1069, 1975.

Potkin, S.G., Cannon, H.E., Murphy, D.L. and Wyatt, R.J. Are paranoid schizophrenic biologically different from other schizophrenics? New England Journal of Medicine, 298, 61-66, 1978.

Reiss, D. Individual thinking and family interaction II. Journal of Psychiatric Research, 5, 193-211, 1967.

Reiss, D. Individual thinking and family interaction III. Journal of Nervous and Mental Diseases, 146, 384-403, 1968.

Reiss, D. Individual thinking and family interaction IV. Journal of Nervious and Mental Diseases, 149, 473-190, 1969.

Reiss, D. Varieties of consensual experience 1. A theory for relating family interaction to individual thinking. Family Process, 10, 1-28, 1971.

Reiss, D., and Wyatt, R.J. Family and biologic variables in the same etiologic studies of schizophrenia: a proposal. Schizophrenia Bulletin, 14, 64-81, 1975.

Robinson, D.S., and Nies, A. Demographic, biologic, and other variables affecting monoamine oxidase activity. Schizophrenia Bulletin, 6, 298-307, 1980.

Rosengarten, H., and Friedhoff, A.J. A review of recent studies of the biosynthesis and excretion of hallucinogens formed by methylation of neurotransmitters or related substances. Schizophrenia Bulletin, 2, 90-105, 1976.

Rosenthal, D., Wender, P., Kety, S.S., Schulsinger, F., Welner, J., and Reider, R. Parent-child relationships and psychopathological disorder in the child. Archives of General Psychiatry, 32, 446-476, 1975.

Schildkraut, J. Norepinephrine metabolism in affective disorders. Comprehensive Psychiatry, 13, 88, 1972.

Schildkraut, J., Herzog, J.M., Orsulak, P., Edelman, S., Shein, H., and Frazier, S. Reduced platelet monoamine oxidase activity in a group of schizophrenic patients. American Journal of Psychiatry, 133, 438-450, 1976.

Schildkraut, J., Orsulak, P.J., Schatzberg, A.F., and Herzog, J.M. Platelet monoamine oxidase activity in subgroups of schizophrenic disorders. Schizophrenia Bulletin, 6, 220-225, 1980.

Schooler, C., Zahn, T., Murphy, D.L., and Buchsbaum, M.S. Psychological correlates of monoamine oxidase acitity in normals. Journal of Nervous and Mental Diseases, 166, 177-186, 1978.

Schuham, A. Power relations in emotionally disturbed and normal family triads. Journal of Abnormal Psychology, 75, 30-37, 1970.

Schuham, A. Activity, talking time and spontaneous agreement in disturbed and normal family interaction. Journal of Abnormal Psychology, 79, 68-75, 1972.

Schulman, R., Shoemaker, D., and Moelis, D. Laboratory measurement of parental behavior. Journal of Consulting Psychology, 26, 109-114, 1962.

Seeman, P., Lee, T., Chau-Wong, M., and Wong, K. Antipsychotic drug doses and neuroleptic/dopamine receptors. Nature, 261, 717-719, 1976.

Shapiro, L.N., and Cowgill, C.W., Criteria for categorizing written family Rorschach responses. Unpublished mauscript, 1973.

Shapiro, L., and Wild, C. The product of the concensus Rorschach in families of male schizophrencis. Family Process, 15, 211-224, 1976.

Singer, M. Family transactions and schizophrenia: I. Recent research findings. In J. Romano (ed). The Origins of Schizophrenia, Proc. of the First Rochester International Conference on Schizophrenia., Amsterdam, Excerpta Medica Foundation, 1967.

Singer, M., and Wynne, L. Differentiating characteristics of parents of childhood schizophrenics, childhood neurotics and young adult schizophrenics. American Journal of Psychiatry, 120, 234-243, 1963.

Singer, M., and Wynne, L. Though disorder and family relations of schizophrenics. III. Methodology using projective techniques. Archives of General Psychiatry, 12, 187-200, 1965.

Singer, M., and Wynne, L. Principles for scoring communication defects and deviances in parents of schizophrenics: Rorschach and TAT scoring manuals. Psychiatry, 29, 260-288, 1966.

Slater, E., and Cowie, V. The Genetics of Mental Disorders. London: Oxford University Press, 1971.

Snyder, S.H., Banerjee, S.P., Yamamura, H.I., and Greenberg, D. Drugs, neurotransmitters and schizophrenia. Science, 184, 1243-1254, 1974.

Spiegel, J.P., and Bell, N.W. The family of the psychiatric patient. In S. Arieti (ed.). American Handbook of Psychiatry, New York: Basic Books, Inc., 1959.

Spitzer, R.L., Endicott, J., and Robins, E. Clinical criteria for psychiatric diagnosis and DSM-III. American Journal of Psychiatry, 132, 1187-1192, 1975.

Stewart, J. Schizophrenia: The systematic construction of genetic models. American Journal of Human Genetics, 32, 47-54, 1980.

Stewart, S.M. Catecholamines and Schizophrenia. Unpublished document. University of Massachusetts, 1978.

Stillman, R.C., Wyatt, R.J., Murphy, D.L., and Rauscher, F.P. Low platelet monoamine oxidase activity and chronic marijuana use. Life Sciences, 23, 1527-82, 1978.

Sullivan, J., Stanfield, C., and Dackis, C. Platelet MAO activity in schizophrenia and other illnesses. American Journal of Psychiatry, 134, 1098-1103, 1977.

Sullivan, J.L., Maltbie, A., Cavenar, J.O., Hammett, E.B., and Lister, P. Monoamine oxidase in schizophrenia (letter to editor). New England Journal of Medicine, 298, 1151, 1978.

U.S. Department of Health, Education and Welfare. ECDEU Assessment Manual for Psychopharmacology. Washington, D.C.: 1976.

van Kammen, D.P., Marder, S.R., Murphy, D.L., and Bunney, W.E. MAO activity, CSF amine metabolism and drug-free improvement in schizophrenia. American Journal of Psychiatry, 135, 567-569, 1978.

Walsh, F.W. Breaching of family generation boundaries by schizophrenics, disturbed nonschizophrenics, and normals. International Journal of Family Therapy, 1, 254-275, 1979.

Waxler, N.E. Cognitive performance in individual family members: A comparison of families with schizophrenia and normal children. Unpublished manuscript, Harvard Medical School, 1972.

Waxler, N. Parent and child effects on cognitive performance: an experimental approach to the etiological and responsive theories of schizophrenia. Family Process, 13, 1-22, 1974.

Weiner, H. Psychobiology and Human Disease. New York: Elsevier North-Holland, Inc., 1977.

White, H., McLeod, M.N. and Davidson, J. Platelet monoamine oxidase activity in schizophrenia. American Journal of Psychiatry, 133, 1191-1194, 1976.

Wild, C., Singer, M., Rosman, B., Ricci, J., and Lidz, T. Measuring disordered styles of thinking. Archives of General Psychiatry, 13, 471-476, 1965.

Wild, C., Shapiro, L., and Goldenberg, L. Transactional communication disturbances in families of male schizophrenics. Family Process, 14, 131-160, 1975.

Wild, C.M., and Shapiro, L.N. Mechanisms of change from individual to family performance in male schizophrenics and their parents. Journal of Nervous and Mental Diseases, 165, 41-56, 1977.

Winblad, B., Gottfries, C.G., Oreland, L., and Wiberg, A. Monoamine oxidase in platelets and brains of non-psychiatric and nonneurological periatric controls. Medical Biology, 57, 129-132, 1979.

Wise, C.D., and Stein, L. Dopamine-beta-hydroxylase deficits in the brains of schizophrenic patients. Science, 181, 334-346, 1973.

Wurtman, R.J., and Axelrod, J. A sensitive and specific assay for the estimation of monoamine oxidase. Biochemical Pharmacology, 12, 1439-1441, 1963.

Wyatt, R.J., Murphy, D.L., Belmaker, R., Cohen, S., Donnelly, C.H., and Pollin, W. Reduced monoamine-oxidase activity in platelets: a possible genetic marker for vulnerability to schizophrenia. Science, 179, 916-918, 1973.

Wyatt, R.J., Potkin, S.G., Walls, P., Nichols, A., Carpenter, W., and Murphy, D.L. Clinical correlates of low platelet monoamine oxidase in schizophrenic patients. In H. Akiskal and W. Webb (eds.). Psychiatric Diagnosis: Exploration of Biological Predictors. New York: Spectrum Publications, 1978, pp. 279-298.

Wyatt, R.J., Potkin, S.G., and Murphy, D.L. Platelet monoamine oxidase activity in schizophrenia: a review of the data. American Journal of Psychiatry, 136, 377-385, 1979.

Wyatt, R.J., Potkin, S.G., Bridge, T.P., Phelps, B.H., and Wise, C.D. Monoamine oxidase in schizophrenia: an overview. Schizophrenia Bulletin, 6, 199-207, 1980.

Wynne, L.C., Schizophrenics and their families: research on parental communication. In J.M. Tanner (ed.). Developments in Psychiatric Research. London: Hodder and Stoughton, 1977, pp. 254-286.

Wynne, L., Singer, M., and Toohey, M. Communications of the adoptive parents of schizophrenics. In J. Jorstad and E. Ungelstad (eds). Schizophrenia 75, Psychotherapy, Family Studies, Research. Universitetsforlaget: Oslo, 1976.

Wynne, L., Singer, M., Bartko, J., and Toohey, N. Schixophrenics and their families: recent research on parental communication. In J. Tanner (ed.). Psychiatric Research: The Widening Perspective, New York: International Universities Press. in press.

Zubin, J., and Freyhan, F.A. Disorder of Mood. Baltimore: The Johns Hopkins Press, 1972.

Zubin, J., and Spring, B. Vulnerability -- a new view of schizophrenia. Journal of Abnormal Psychology, 86, 103-126, 1977.

APPENDIX

Family Interaction Tests: Instructions to Subjects and Scoring Procedures

20 Questions Task

> Now I'm going to ask (all three of) you to work (together) on something. I will think of one of the pictures in a square on this chart. What I'd like you to do is see if you (as a group) can find out which picture I'm thinking of by asking me questions. You should decide what you want to ask and (when you have agreed on a question, one of you) write it down on this sheet and then ask it aloud. These must be questions that I can answer by saying "yes" or "no". Try to find out the correct picture in as few questions as possible. Alright, I'm going to think of a picture. You can begin asking questions as soon as you are ready. After you have gotten the first picture correctly, I'll think of another one so just go right on to the next item after you have finished this one. There will be three items. The most efficient approach is to ask categorical questions, each of which divides the remaining number of objects in half, until only one remains."

Cognitively, this strategy requires two abilities: that of abstraction, i.e. finding superordinate categories into which a large number of the items fit, and that of attending, i.e. keeping track of the information that has already been obtained. The nature of the task allows for the observation and scoring of several dimensions of behavior. Because of its structured nature, abstraction and difficulties in attending can be quantified and scored.

As family members can contribute varying degrees to the strategies used by the family, it is possible to take measures reflecting dominance of the individuals with the family. In addition, a variety of comparisons between individual and family test behavior provides indicators of the impact of the family on the individual.

Scoring: 1) Number of questions asked. Each family member's score in the indivdual session (i) was calculated. Each family unit also received an efficiency score (ii) which consisted of the total questions asked by all members during the family session. With these scores, a "question change" score (iii) could be tabulated for each member, which reflected the difference in efficiency between that member's individual performance and the family's joint performance.

2) Abstraction. This was measured by classifying questions into categories of guess (a concrete strategy), and constraint (an abstract strategy which refers to more than one item on the board). Each family member received a score for the proportion of constraints among his/her questions during the individual (iv) and the family (v) sessions. Again, a constraints change score (vi) reflecting the difference between each member's cognitive strategy during individual and family sessions could be tabulated. As the questions change score reflected the impact of family on

efficiency, so the constraints change score reflected the impact of family on cognitive strategy.

3) Attention difficulties. These were scored only in the family session, "Amorphousness", an important concept in the early literature of family interaction (e.g. Singer and Wynne, 1963,) was operationalized by Wild and her group (Shapiro and Cowgill, 1973). Their method of scoring was used in this research. Briefly, on every occasion that a family member made a statement indicating initial failure to grasp the task, loss of general task set or specific procedures in instructions, loss of content (e.g. repeating questions already asked), perceptual difficulties (e.g. problems perceiving or locating objects on the chart), this was scored as an amorphous response. Each family member received a score of frequency of such behavior during the family session (vii). On every occasion that another family member corrected a difficulty experience by the memeber showing amorphousness, the former received a correction score (viii).

4) Suggested questions. All questions during family sessions were scored in one of the 3 following categories, for the member who initiated them. Suggested but not asked (ix): these were questions that were suggested by one family member but were either rejected by the family, or replaced with another question instead of being submitted

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to the examiner. Asked (x): these questions were suggested by a member to the family, discussed, accepted, and then asked of the examiner. In other words, these questions were submitted according to the rules set by the examiner. Spontaneously asked (xi): these questions were initiated and asked of the examiner simutaneously, without discussion by other group members. This last category has been considered an indication of difficulties in reaching closure, or clear meaning and agreement and was used in this experiment as an indicator of closure difficulty.

Dominance ratios were computed from these data. The first ratio (xii) was the proportion of the total questions initiated by the individual family member, that were put to the examiner, i.e. (x) + (xi) / (ix) + (x) + (xi). This ratio is considered to be a dominance measure because the more dominant a family member, the fewer of his/her questions will be rejected by the family, and the more active he/she will be in suggesting questions. The second dominance ratio (xiii) provides a comparison between different family members. It represents the proportion of the family's total questions put to the examiner, that were initiated by this family member, i.e. (x) + (xi) / (ii).

The Family Group Rorschach

The following instructions are given to the family:

> For each card we would like you as a family to find one thing it could look like on which you all can agree. When you have decied on the thing it looks like, raise your hands.

After the family members have indicated that they have agreed on a common response, the experimenter pick up the card and says:

> Would each of you write down the response you all agreed upon, the one that you decided on, on these papers? Please write it down without discussing it with one another. Then, on this second sheet (location chart) would you circle the area of the blot in which the response appears and label any parts of the response which would help us to see it as you do?

Scoring: The Rorschach was scored according to the "Criteria for Categorizing Written Family Interaction" developed by Shapiro and Cowgill (1973). Only the family session productions are scored. Each of the three Rorschach cards was given a score from 1-9, with 1 representing the most vague, and 9 the clearest and most elaborated response. Each category is described in detail with examples in Shapiro and Cowgill (1973), and will be briefly summarized here. The scores correspond to the presence of the following:

1. vagueness,
2. qualification,
3. disagreement,
4. no parts labelled, or one person labels only one part,
5. at least one person labels two or more parts, and

at least one person does not label at all,

6. all those not in previous categories where at least one person labels only one part,

7. unelaborated, popular and specific responses, and general and popular responses which are simply elaborated,

8. two or more separate and unrelated responses which may be popular and specific, and elaborated or not,

9. complex elaborated responses which often contain two or more related and integrated elements.

Scores 1-3 were determined from the written responses of family members. Scores 4-6 were determined from their location chart markings. Scores 7-9 were determined from both written and location chart responses, and had to do with the quality of the response. One each card, a family score was obtained. The score received was the lowest score for which the family responses qualified, e.g. if the responses were extremely vague, and disagreement between members existed, the family score received was 1. The family Rorschach score (xiv) is the average of the scores for the three cards.

The Ferreira-Winter Questionnaire

Scoring: Individual and family performance on this questionnaire were graded on two dimensions: spontaneous agreement, a family measure, i.e. the number of agreements

among family members found to exist before any family discussion (xv); and choice fulfilment, a measure obtained for every family member, reflecting the extent to which the family's choices reflected the individual's choices (xvi). A mean choice fulfilment score was also computed for each family (xvii).

Means and Standard Deviations on Control and Dependent Measures

Means and standard deviations on control and dependent measures on the family interaction tasks are presented in the tables following. Dependent measures are presented separately for each of the eight subgroups, for patients and parents. Family scores, i.e., measures on which all members of the same family receive an idential score, is presented in a separate table. The composite measures, except for dominance ratios, are not presented. A description of the measures can be found in Table 2 (p. 64) throughout the tables following, the groups are abbreviated thus:

A: Schizophrenic/Male Patient/Single Parent
B: Schizophrenic/Male Patient/Intact Family
C: Schizophrenic/Female Patient/Single Parent
D: Schizophrenic/Female Patient/Intact
E: Control/Male Patient/Single Parent
F: Control/Male Patient/Intact
G: Control/Female Patient/Single Parent
H: Control/Female Patient/Intact

Table 17

Means and Standard Deviations on Control Measures

Group	SES $\bar{X}$	SES S	Parents IQ $\bar{X}$	Parents IQ S	Patients IQ $\bar{X}$	Patients IQ S
A	8.3	.83	9.3	1.09	9.0	2.45
B	6.4	2.50	12.4	2.16	11.6	2.56
C	4.8	1.67	9.8	.69	10.8	1.95
D	3.9	1.73	11.1	2.96	13.0	3.20
E	7.6	1.59	8.7	3.41	9.6	2.87
F	6.8	2.27	11.1	1.27	13.5	3.04
G	3.4	.49	12.0	2.14	12.0	2.14
H	4.8	3.03	12.4	2.34	13.0	1.5

Group	Parents IQ $\bar{X}$	Parents IQ S	Patients Age $\bar{X}$	Patients Age S
A	44.3	9.28	17.3	3.41
B	55.2	6.80	27.3	5.77
C	48.2	6.96	20.3	4.98
D	50.6	8.31	20.3	4.40
E	45.4	11.51	22.9	8.0
F	60.0	7.63	28.5	2.5
G	50.7	10.87	20.9	6.49
H	58.0	6.27	28.0	5.87

Table 18

Means and Standard Deviations on Family Interaction Measures for Patients

Group	$\bar{X}$ (i)	S	$\bar{X}$ (iv)	S	$\bar{X}$ (v)	S	$\bar{X}$ (vii)	S
A	31.8	13.52	.41	.221	.32	.264	13.3	9.29
B	31.3	12.54	.42	.231	.49	.351	6.1	5.27
C	37.3	15.59	.32	.280	.52	.231	2.3	2.94
D	38.6	26.58	.48	.262	.64	.260	6.3	6.95
E	26.6	4.72	.56	.153	.64	.112	6.1	12.80
F	23.0	6.16	.48	.221	.49	.254	3.0	4.10
G	23.7	7.83	.54	.133	.64	.201	4.4	7.41
H	22.5	4.80	.70	.118	.60	.227	2.0	1.41

Group	$\bar{X}$ (viii)	S	$\bar{X}$ (ix)	S	$\bar{X}$ (x)	S	$\bar{X}$ (xi)	S
A	.5	.58	1.5	2.38	1.5	2.38	27.8	20.12
B	1.0	2.15	3.4	2.37	6.3	5.79	2.1	2.27
C	1.0	1.10	2.7	5.13	3.0	3.22	11.5	6.89
D	1.3	1.70	4.0	4.86	3.3	4.07	4.3	6.73
E	.3	.49	2.0	3.61	6.6	5.16	10.7	13.24
F	1.3	.96	.3	.50	2.8	2.21	6.8	7.27
G	.9	1.2	2.9	4.56	7.0	5.42	10.7	8.71
H	2.5	2.38	2.8	2.63	7.3	2.06	6.8	2.87

Table 18 (cont'd)

Means and Standard Deviations on Family Interaction Measures for Patients

Group	(xii) $\bar{X}$	(xii) S	(xiii) $\bar{X}$	(xiii) S	(xvi) $\bar{X}$	(xvi) S
A	.93	.102	.54	.274	25.3	4.93
B	.69	.246	.27	.142	27.2	4.79
C	.88	.221	.48	.223	35.4	4.09
D	.68	.371	.36	.235	31.0	5.55
E	.88	.180	.55	.199	28.7	5.65
F	.95	.100	.38	.085	33.8	5.56
G	.90	.153	.61	.055	31.4	3.21
H	.82	.186	.52	.093	33.0	3.56

Table 19

Means and Standard Deviations on Interaction Measures for Mothers

Group	$\bar{X}$ (ix)	SD	$\bar{X}$ (x)	SD	$\bar{X}$ (xi)	SD	$\bar{X}$ (xii)	SD
A	.8	1.50	2.3	2.22	13.3	10.87	.93	.151
B	5.0	2.94	5.4	1.81	3.7	4.61	.64	.160
C	5.0	11.21	3.7	4.08	10.8	9.28	.87	.260
D	3.0	3.16	3.9	3.53	5.1	3.89	.79	.212
E	.7	1.11	6.1	5.40	7.3	7.13	.94	.101
F	2.5	3.80	3.3	2.06	3.5	2.45	.76	.289
G	2.4	3.51	4.7	3.30	6.0	4.97	.86	.198
H	2.5	1.73	4.5	2.38	3.0	4.76	.66	.250

Group	$\bar{X}$ (xiii)	SD	$\bar{X}$ (xvi)	SD	$\bar{X}$ (i)	SD	$\bar{X}$ (iv)	SD
A	.41	.247	24.3	4.93	36.3	11.62	.30	.231
B	.33	.144	33.0	7.40	29.0	11.60	.41	.233
C	.42	.18	34.5	4.96	42.8	13.85	.31	.210
D	.36	.108	31.7	3.27	28.4	12.58	.57	.163
E	.45	.199	33.3	5.24	39.0	16.85	.35	.184
F	.28	.123	29.0	2.71	32.8	12.53	.23	.252
G	.39	.055	35.7	3.39	24.4	8.73	.52	.144
H	.24	.098	30.3	1.26	29.0	18.85	.53	.194

Table 19 (cont'd)

Means and Standard Deviations on

Interaction Measures for Mothers

Group	(v) $\bar{X}$	SD	(vii) $\bar{X}$	SD	(viii) $\bar{X}$	SD
A	.34	.302	10.5	11.39	2.3	1.71
B	.55	.353	10.0	7.85	2.0	1.73
C	.42	.235	5.3	5.09	.3	.52
D	.63	.240	5.9	6.37	2.0	3.56
E	.52	.281	4.4	1.80	.7	1.50
F	.58	.292	2.3	1.51	.3	.50
G	.65	.213	3.6	3.15	.7	.95
H	.69	.303	3.5	2.38	1.5	1.29

Table 20

Means and Standard Deviations on Interaction Measures for Fathers

Group	(i) $\bar{X}$	SD	(iv) $\bar{X}$	SD	(v) $\bar{X}$	SD	(vii) $\bar{X}$	SD
B	32.4	15.37	.42	.231	.59	.290	5.7	6.65
D	40.6	24.21	.33	.300	.53	.172	2.4	1.99
F	35.7	17.37	.46	.210	.81	.191	3.0	2.61
G*	18.0	-	.56	-	.60	-	0	-
H	30.5	10.50	.59	.096	.80	.190	4.5	2.38

Group	(viii) $\bar{X}$	SD	(ix) $\bar{X}$	SD	(x) $\bar{X}$	SD	(xi) $\bar{X}$	SD
B	2.4	1.81	2.4	1.13	6.4	2.57	5.7	5.74
D	.6	1.13	3.4	4.47	5.3	3.15	4.3	3.68
F	.8	.96	1.5	2.38	3.5	2.38	4.0	2.94
G*	2.	-	0	-	3.0	-	7.0	-
H	3.3	2.63	3.3	2.63	2.8	1.89	4.0	4.97

Group	(xii) $\bar{X}$	SD	(xiii) $\bar{X}$	SD	(xvi) $\bar{X}$	SD
B	.81	.103	.34	.121	33.8	7.39
D	.80	.235	.38	.155	30.6	5.98
F	.90	.132	.33	.134	34.0	6.68
G*	1.00	-	.32	-	36.0	-
H	.67	.220	.24	.033	32.5	2.38

*only one father in this group

Table 21

Means and Standard Deviations on Family Scores

Group	(ii) $\bar{X}$	SD	(xiv) $\bar{X}$	SD	(xv) $\bar{X}$	SD	(xvii) $\bar{X}$	SD
A	44.8	19.14	2.8	1.71	13.7	5.77	24.8	2.46
B	29.7	8.12	4.1	1.07	14.4	3.51	31.3	4.81
C	29.0	9.08	3.4	2.02	21.4	6.77	32.7	5.56
D	26.1	7.49	4.0	1.26	14.2	4.92	30.7	3.10
E	39.0	13.56	5.7	1.60	20.4	3.21	31	5.35
F	23.3	8.85	4.9	1.50	13.3	6.45	32.2	3.40
G	28.3	7.72	5.4	1.36	23.3	2.80	33.0	4.01
H	28.3	12.97	5.7	1.52	14	3.16	32.6	2.91

Table 22

Medications Taken by Subjects in Experiment II by Generic Name

Cholestyramine
Diazepam
Diazoxide
Digoxin
Insulin
Lithium
Meprobamate
Methyldopa
Metronidazole
Nitroglycerin
Penicillin
Prochlorperazine- Isopropamide
Propranolol hydrochloride
Quinidine gluconate
Sodium levothyroxine
Sodium warfarin